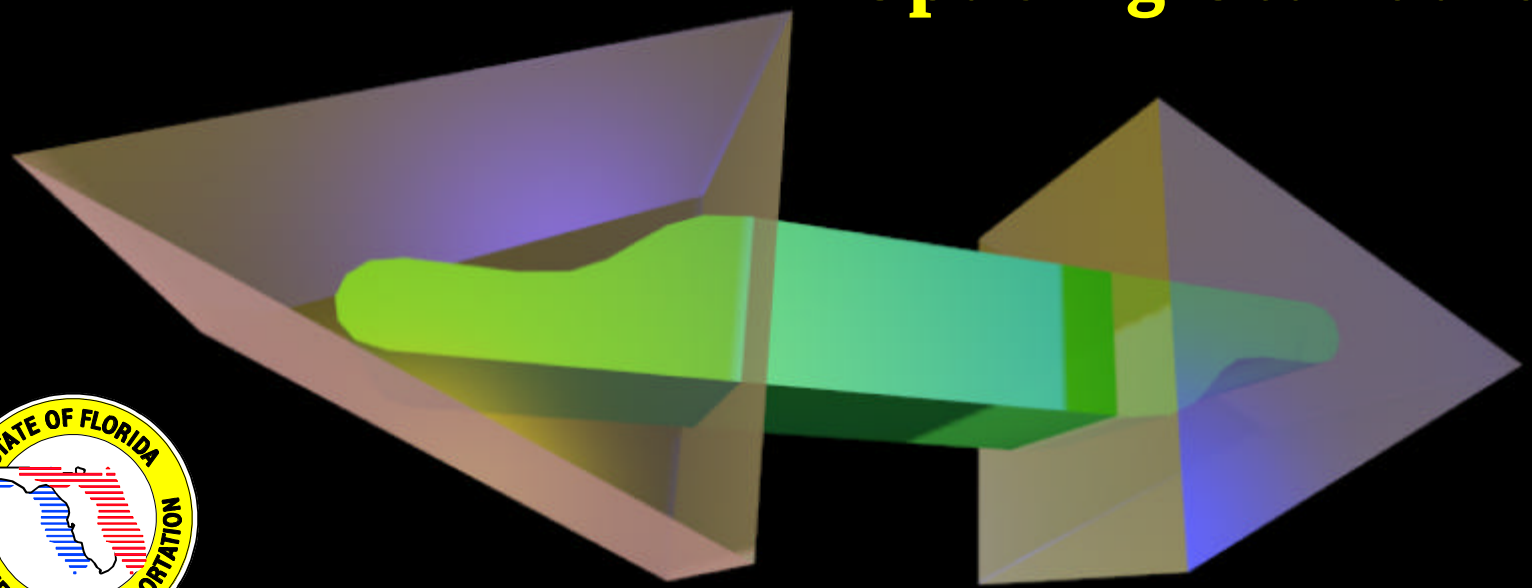
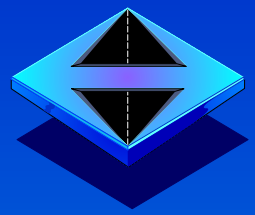
A procedure for decision making

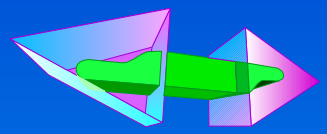
Deviations from Median Opening Spacing Standards



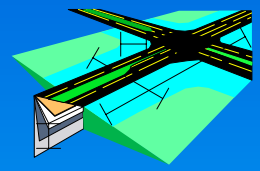
Where do we start?



Statute and Rule allows flexibility



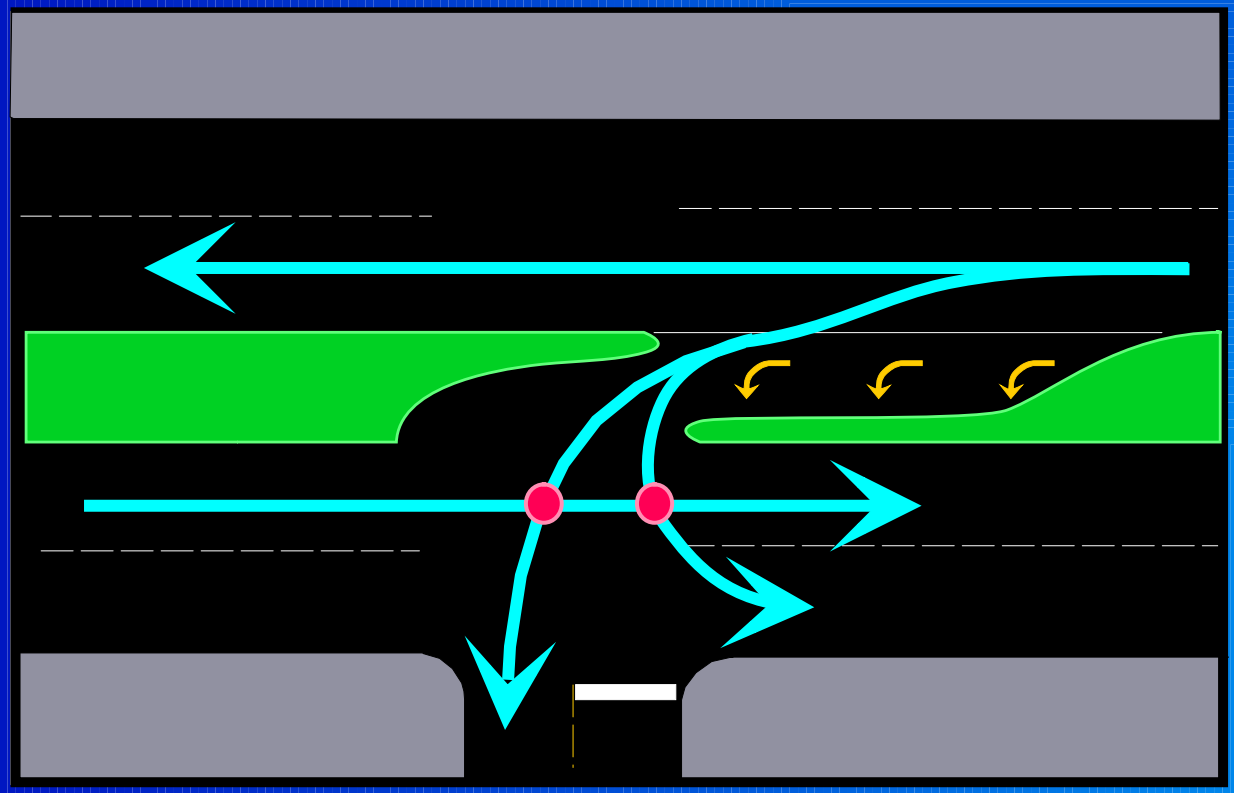
Spacing criteria are only part of Rule 14-97



Median location is a Traffic Engineering issue

Not strictly a permit issue

What's a Directional Opening?



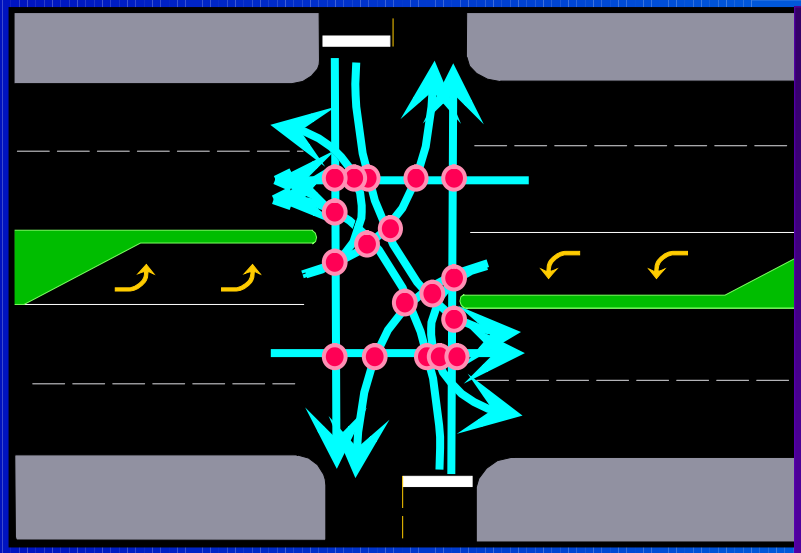
ONLY

2

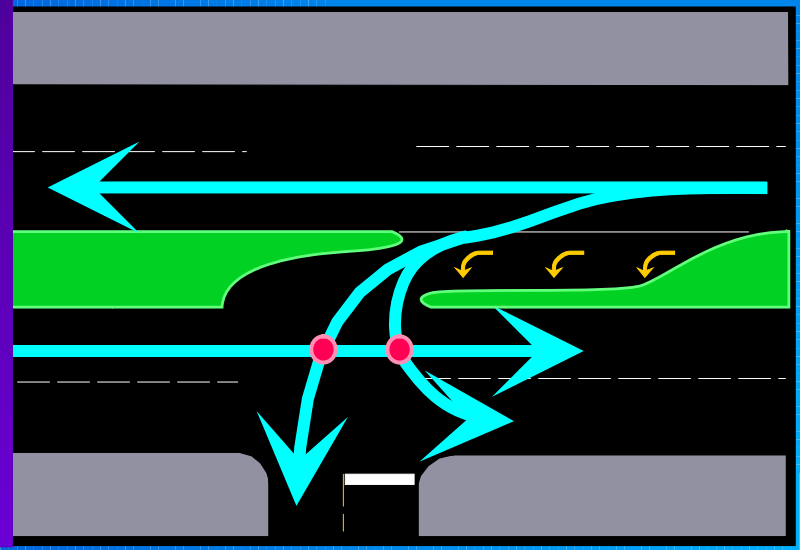
MAJOR

Conflicts

Why Directional Openings?

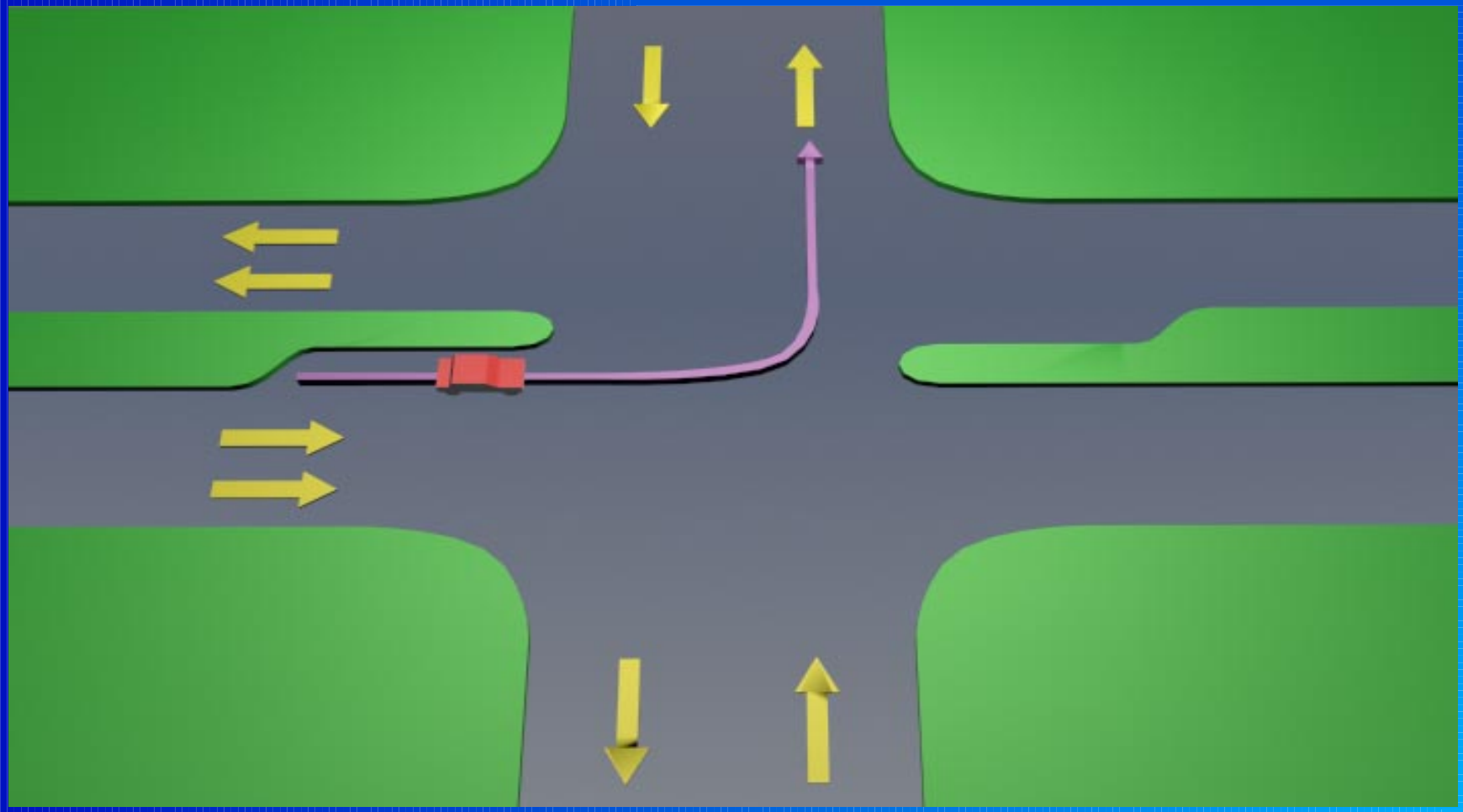


Reduces Conflicts

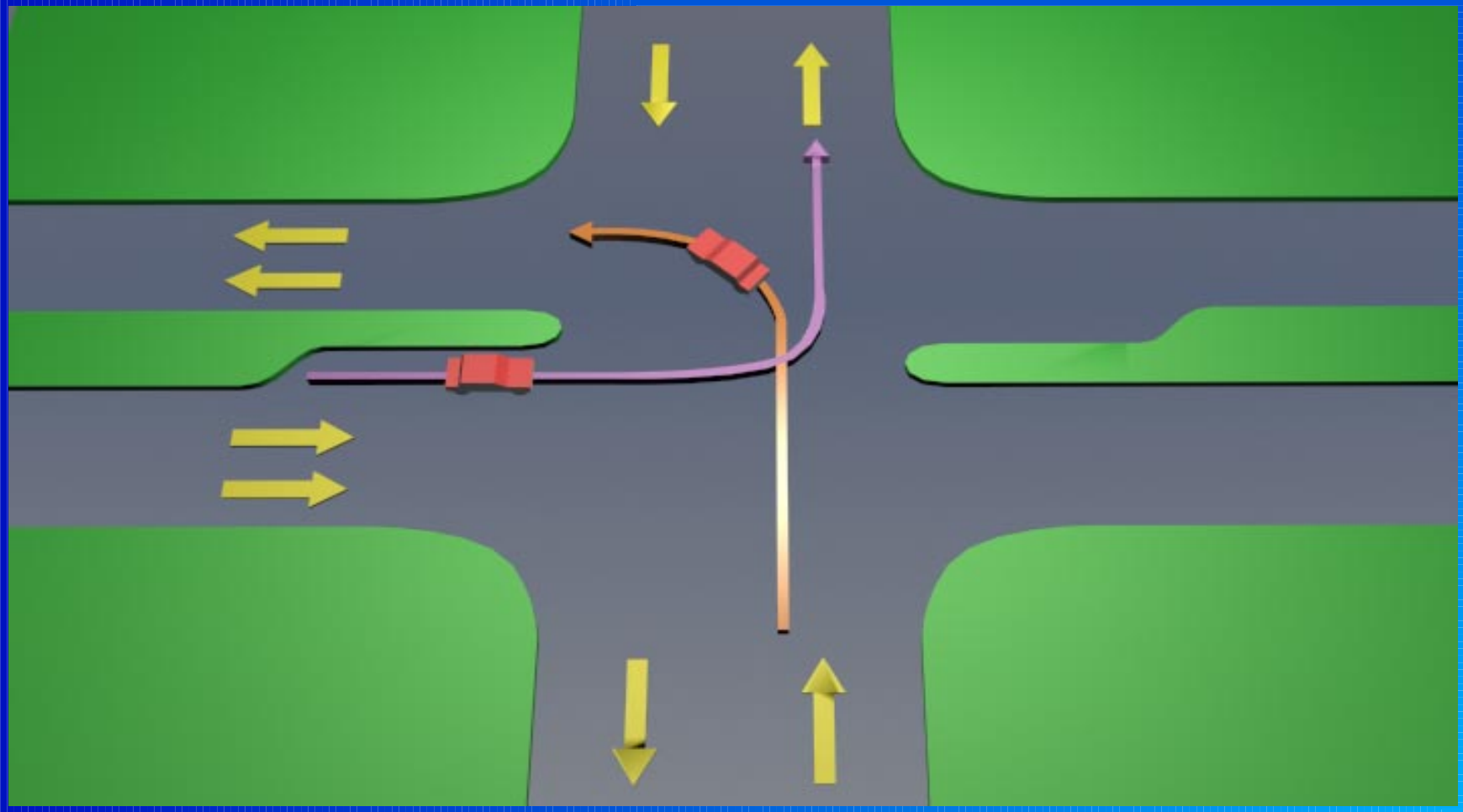


What's so good about directional median openings?

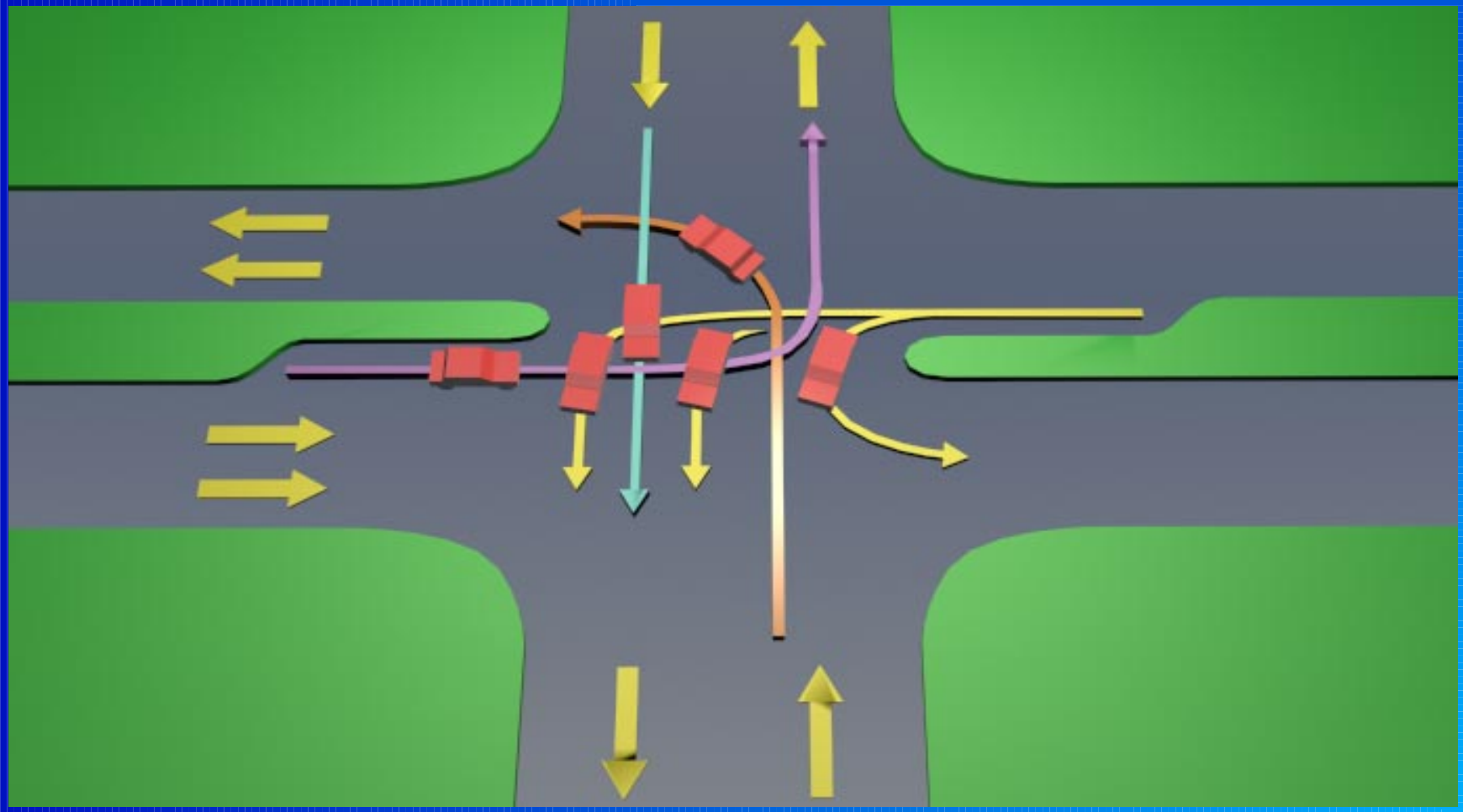
What can go wrong at full openings ?



What can go wrong at full openings ?

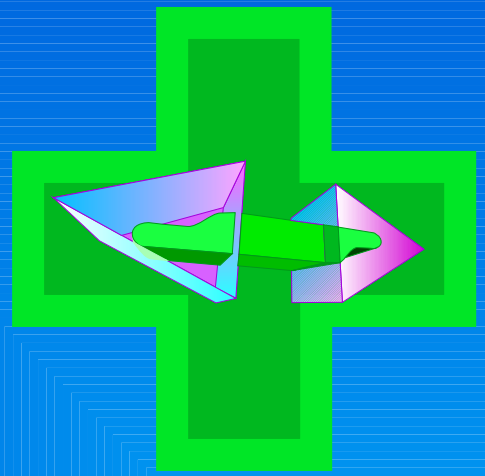


What can go wrong at full openings ?



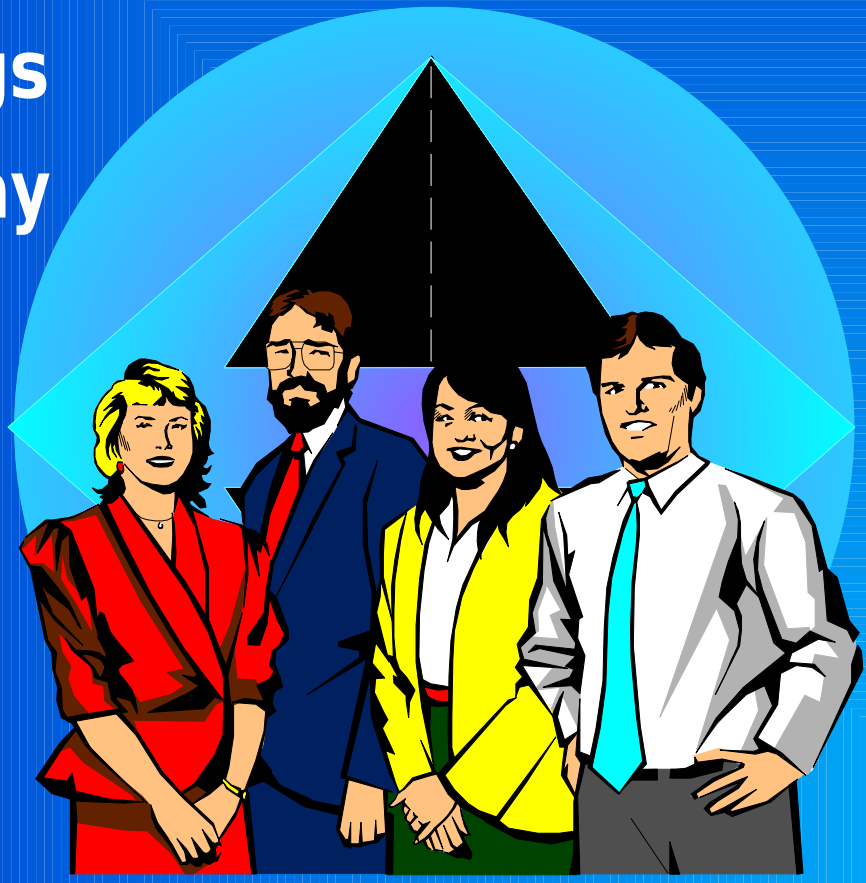
Guiding Principles

- Safety is the primary concern
- Show overriding benefit in safety or operations
  or at least does not degrade
  - traffic conditions
  - safety
  - functional integrity
- Function guides decisions - Intrastate
- People kept informed



Keeping People Informed

- Important even when not required by law
- Big public hearings not always the way



Public Involvement

- Begin involvement **before** public hearing
- Be aware
  - Remember . . . even in one year
  - the owners, businesses, etc. may change
- District 4
  - Guidelines for 30+ affected parties
  - Guidelines for <30 affected parties

Who handles public involvement?

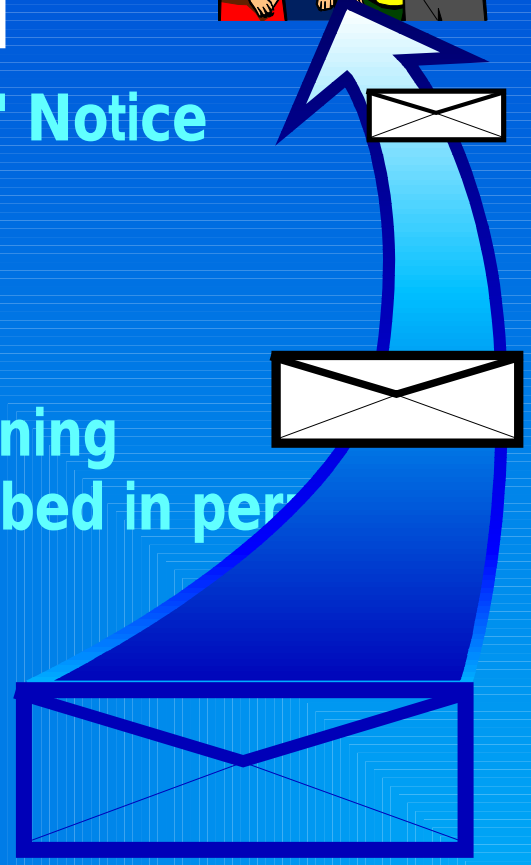
- **Depends on the stage of improvement**
  - Design - Design Project Manager
  - Safety/Traffic Ops - Traffic Ops Engineer
  - Permitting - Permitting Staff

- **Official notification has to be given by department staff or its agent**
  - Petitioner may handle arrangements
  - But - Official notification must come from Department

- **Notice does not = compensation**

FS 120 Notification

- **All parties should be informed**
  - Not everyone must receive a "120" Notice
  - It's really a continuum
- **Notice for sure**
  - Permittee just paid for median opening
  - Permittee has median turns described in per
- **No noticed required**
  - A 2 lane corridor scheduled for 4 lane divided



How to handle during production

- Existing features will play an important role
- "Reasonable Conformance"
- Not automatic at public roads
- More extensive the work . . .

  . . . the more aggressive the median treatments

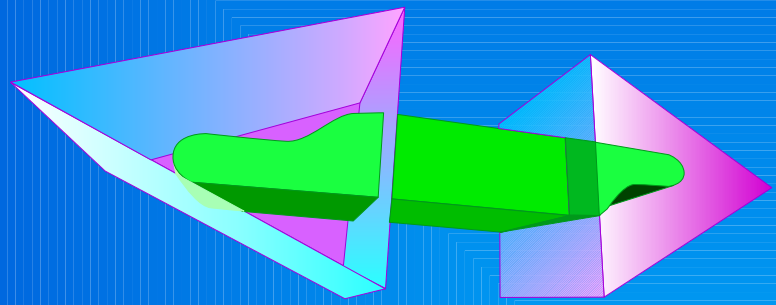
  High - new construction

  Lower - resurfacing

How aggressive in resurfacing?

It depends on:

- existing problems
- life of project
- crash experience
- desired function - classification

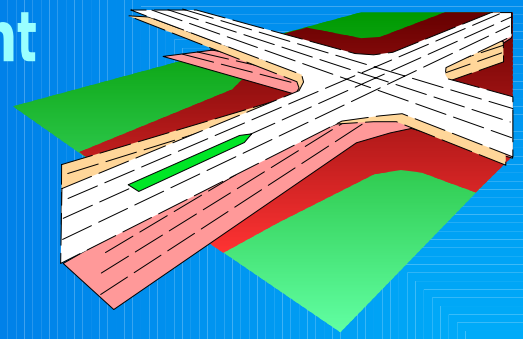


Important Resurfacing Issues

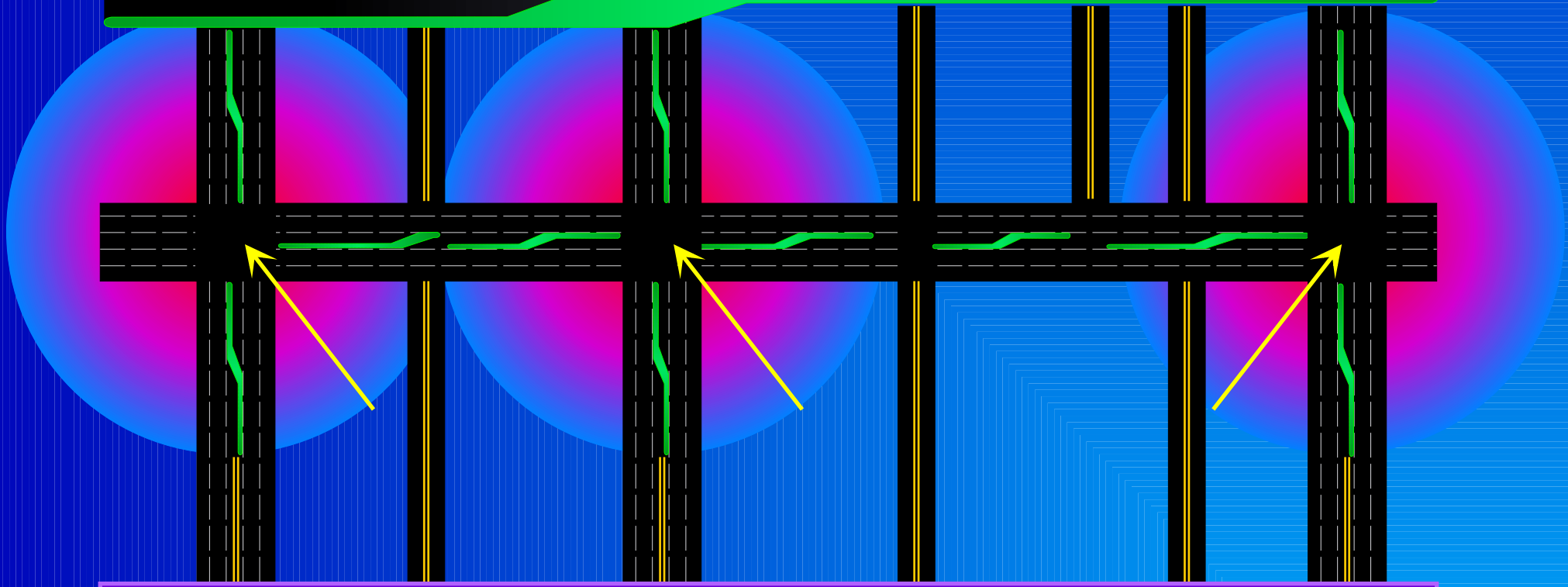
- **Keep public informed**
- **Do the technical work**
- **Traffic/safety justification for closures**
  - Not just existing crashes but
  - potential problems may justify actions

When to handle in production

- **PD&E Preferred**
  - Unless Design Phase is 4 or more years away
  - But even then, much can be done for known major cross streets
- **Should be done at least by 30% Design Phase**
  - Changes can be made later with appropriate public involvement



How much can be done "early on" in production?



- Median opening design can start at major intersections early

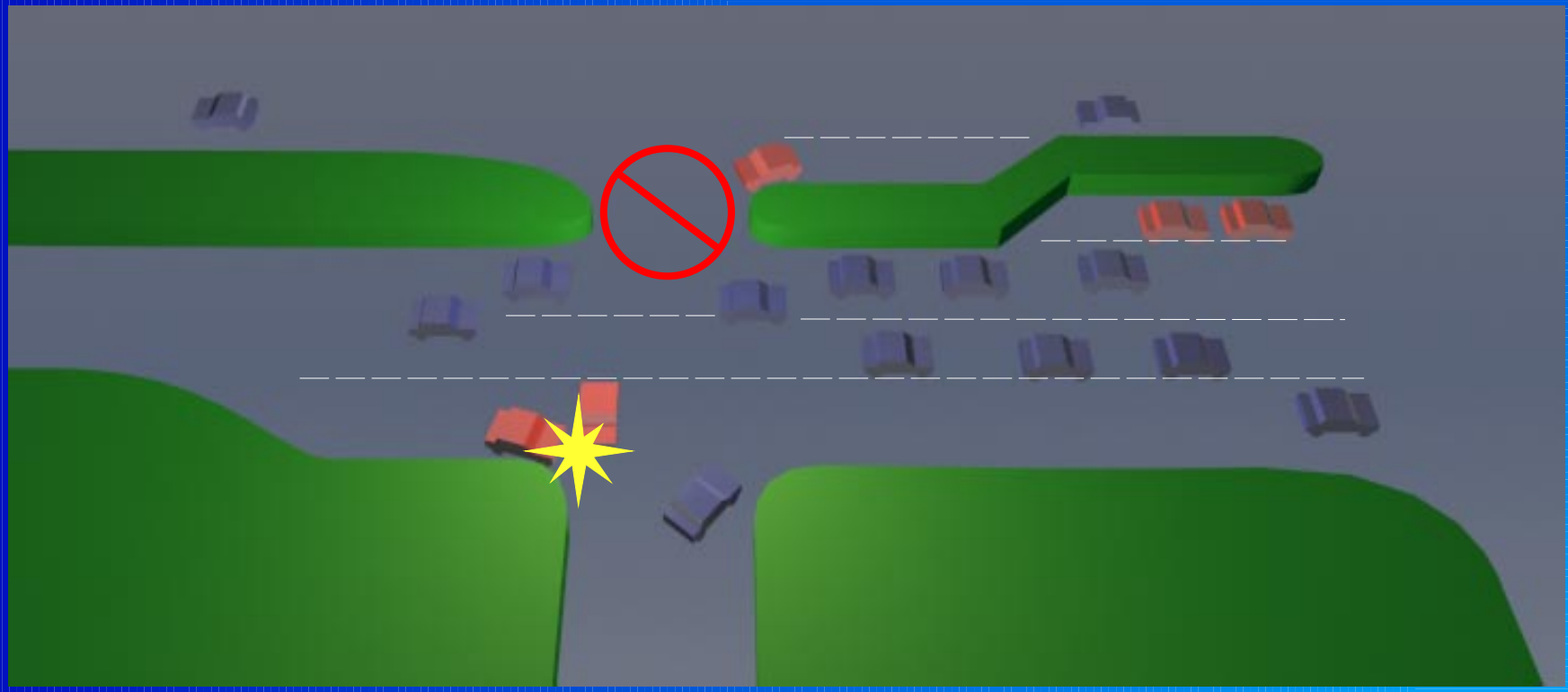
How much can be done "early on" in production?

A projected need for queue storage **here**

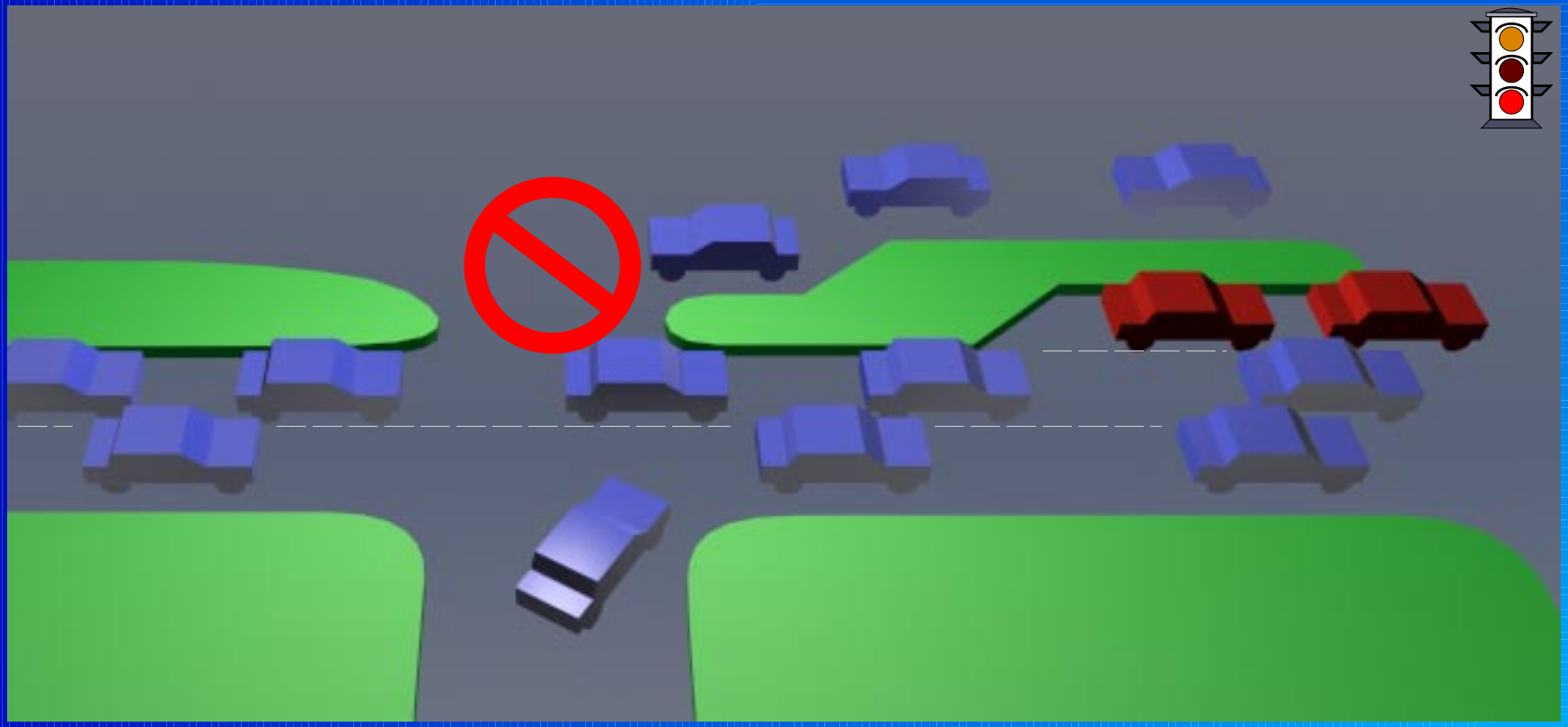
will prevent a median opening **here**

No More Median Removals

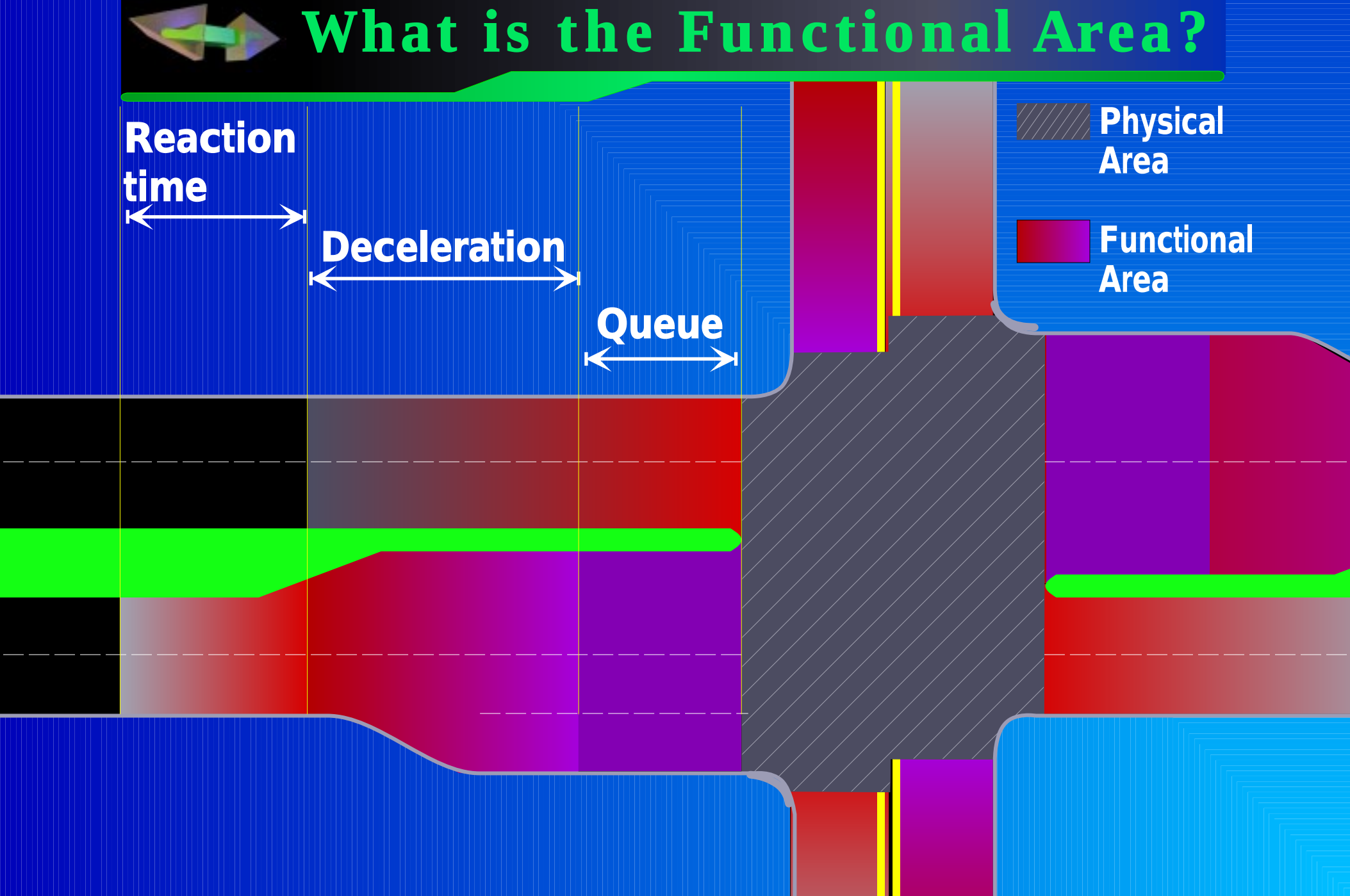
Avoid openings across right turn lanes



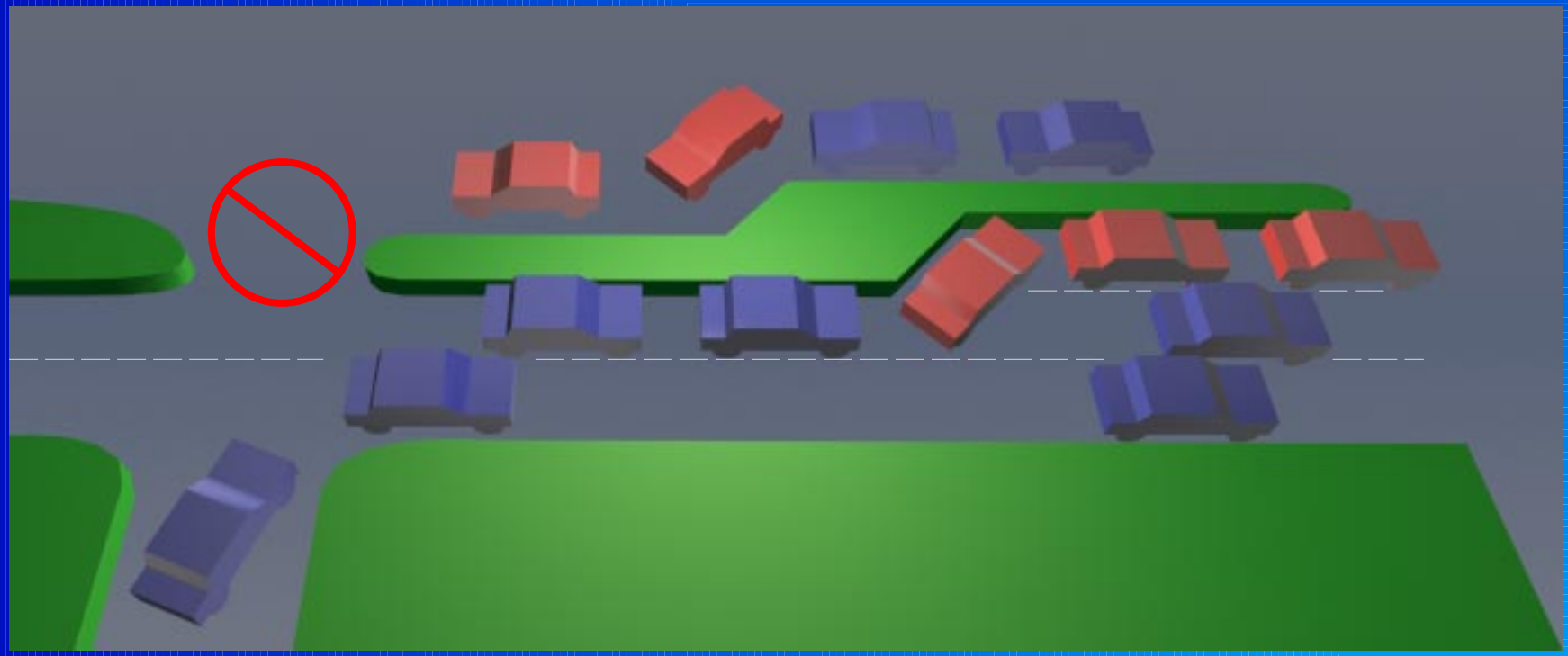
No more openings in functional area



What is the Functional Area?

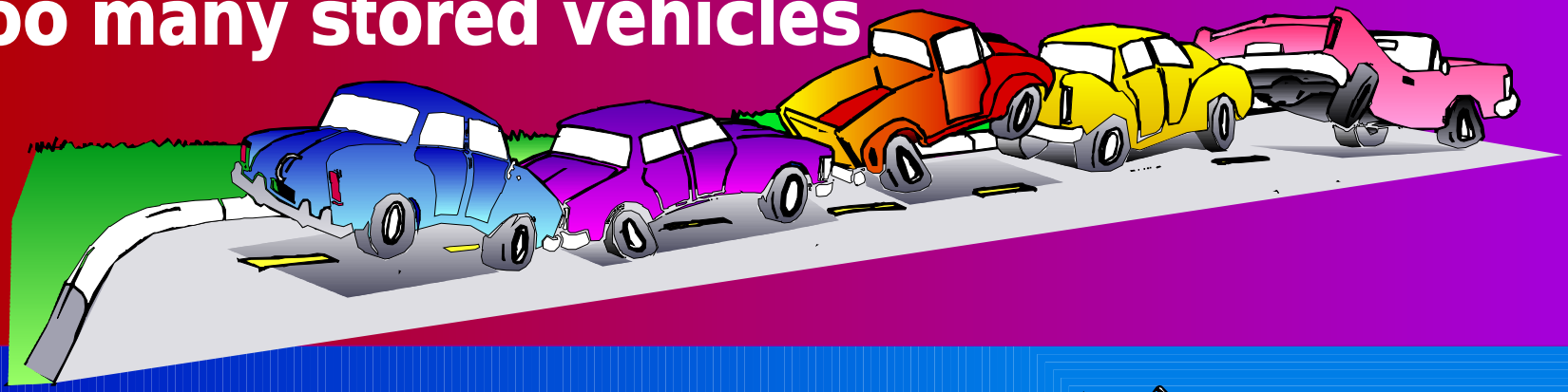


No openings that fail

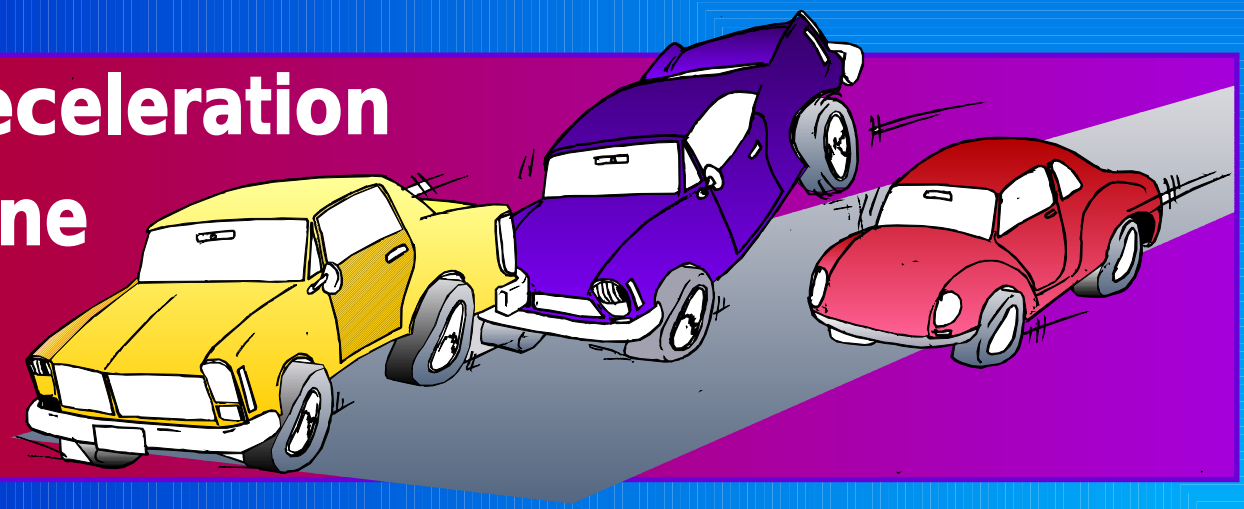


What is Median Opening Failure?

Too many stored vehicles

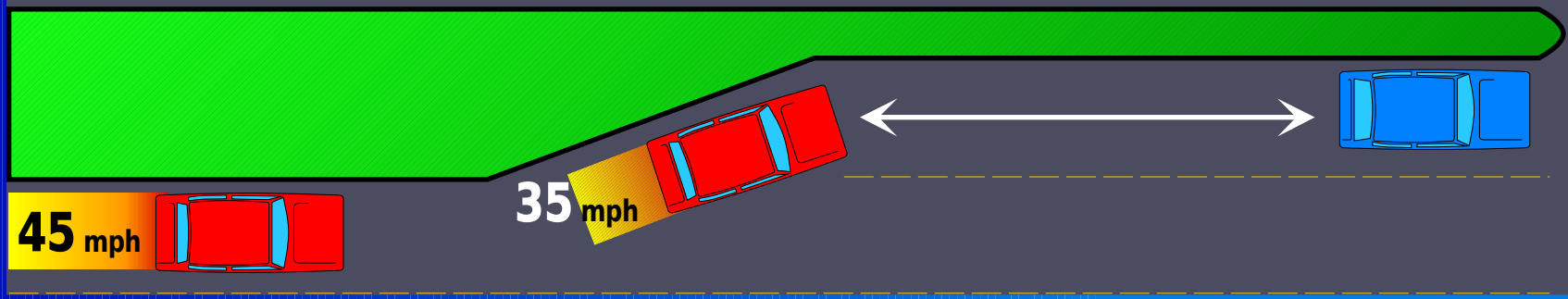


Excessive deceleration in through lane

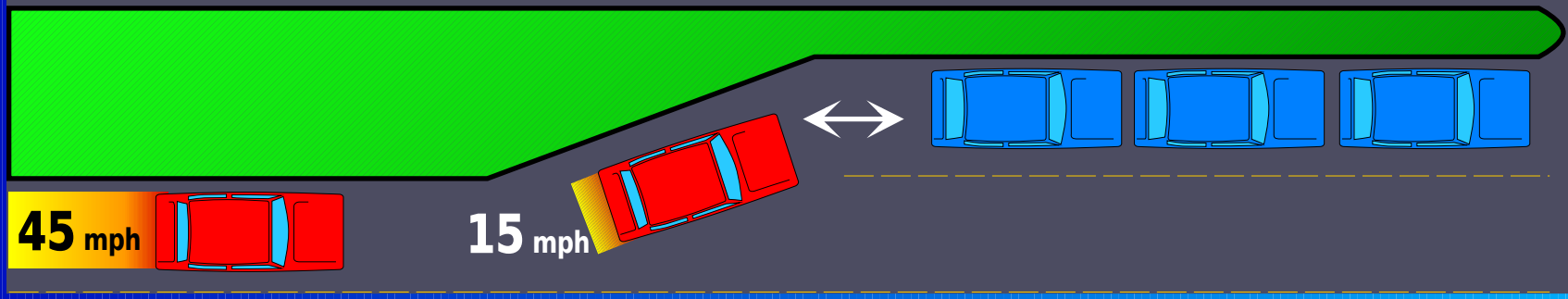


Excessive Deceleration

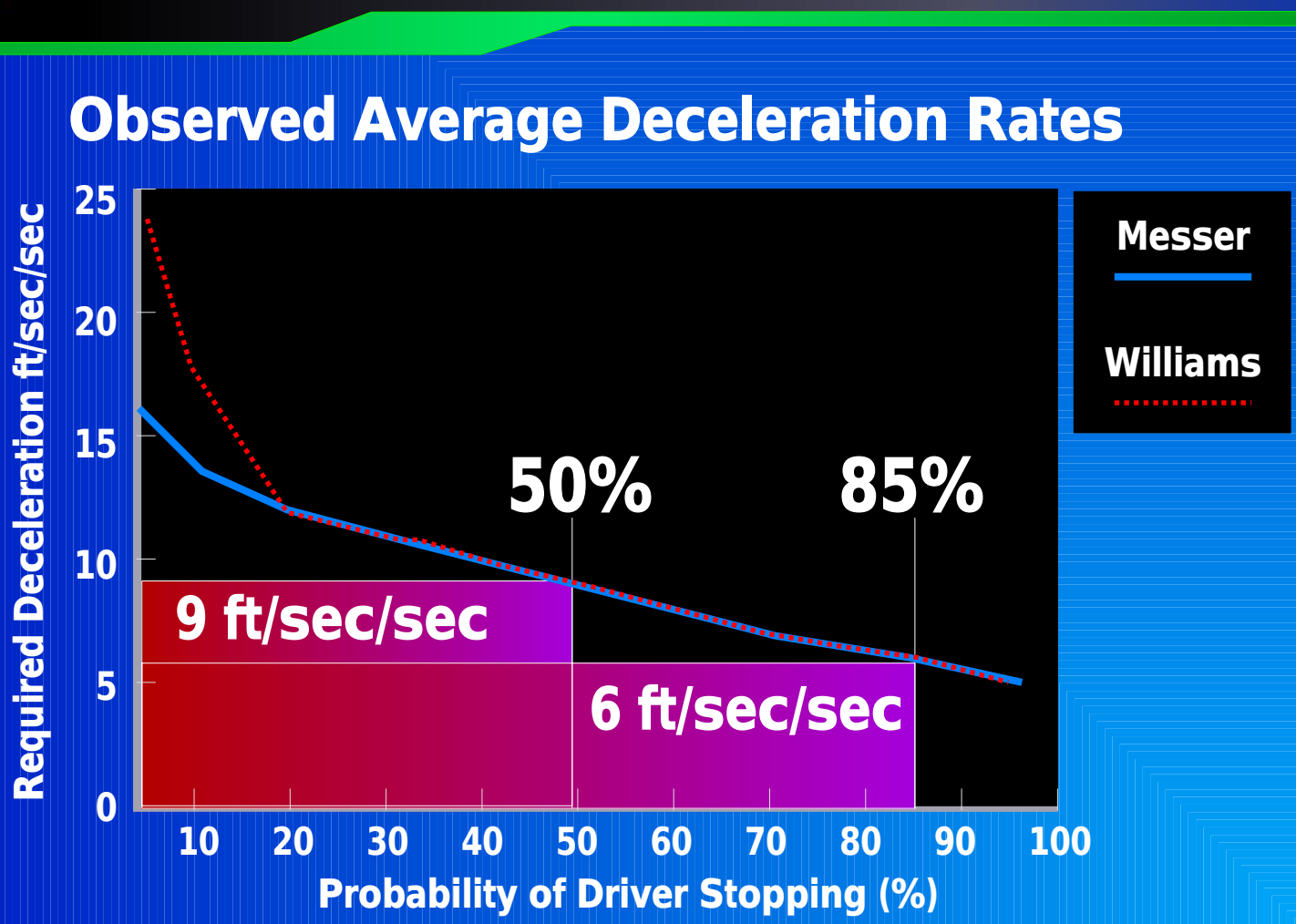
10 mph speed differential



30 mph speed differential



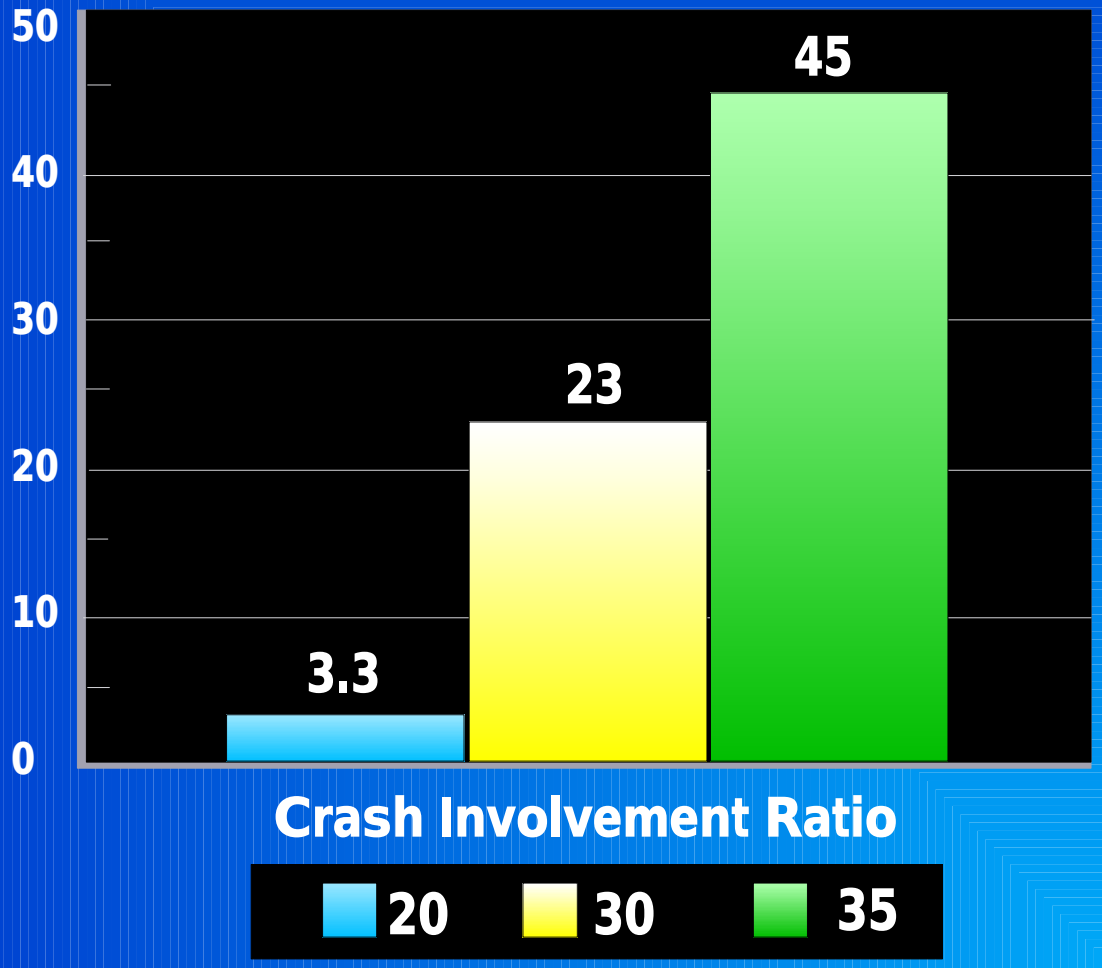
Let's talk deceleration



Let's talk speed differential

Relative crash involvement rate ratios

in comparing speed differentials over 10 mph for arterial roads

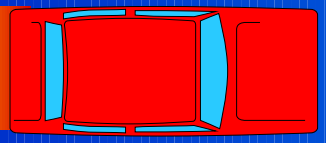


Solomon: 1964
Bureau of Public Roads
Accidents on Main Rural Highways related to speed

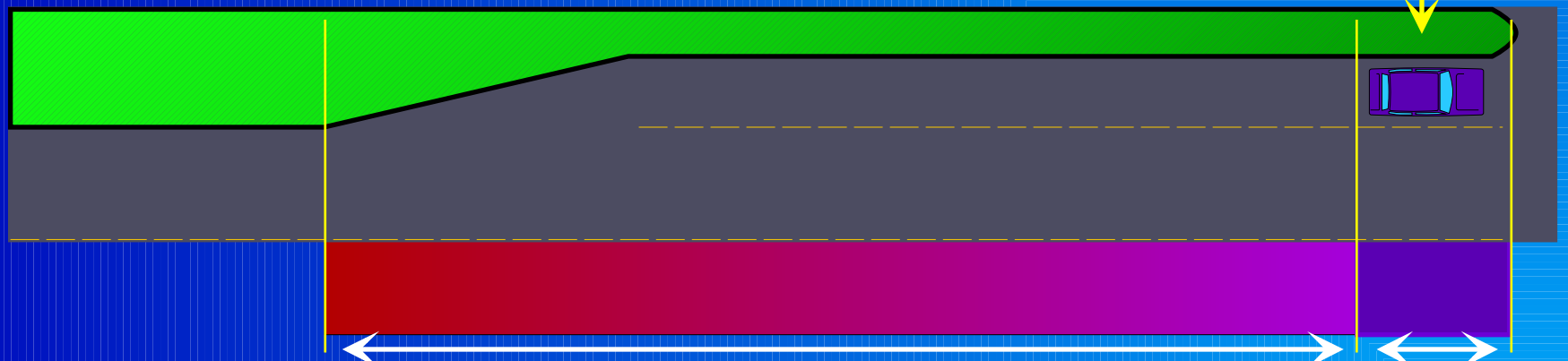
Standard Index #301

Storage and deceleration requirements

@ 45 mph



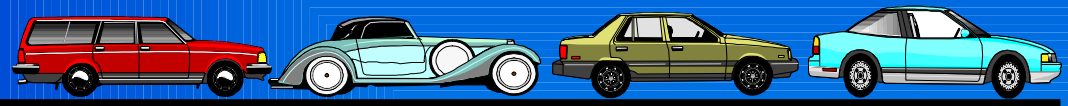
#301 has no standard for min. queue



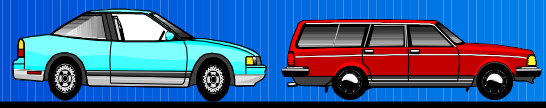
Recommended Queues

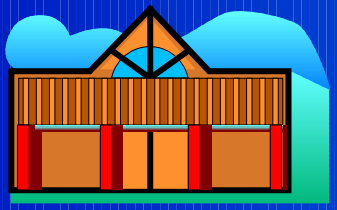
As measured or projected by traffic study

- **4 cars urban minimum**



- **2 cars rural or small town**





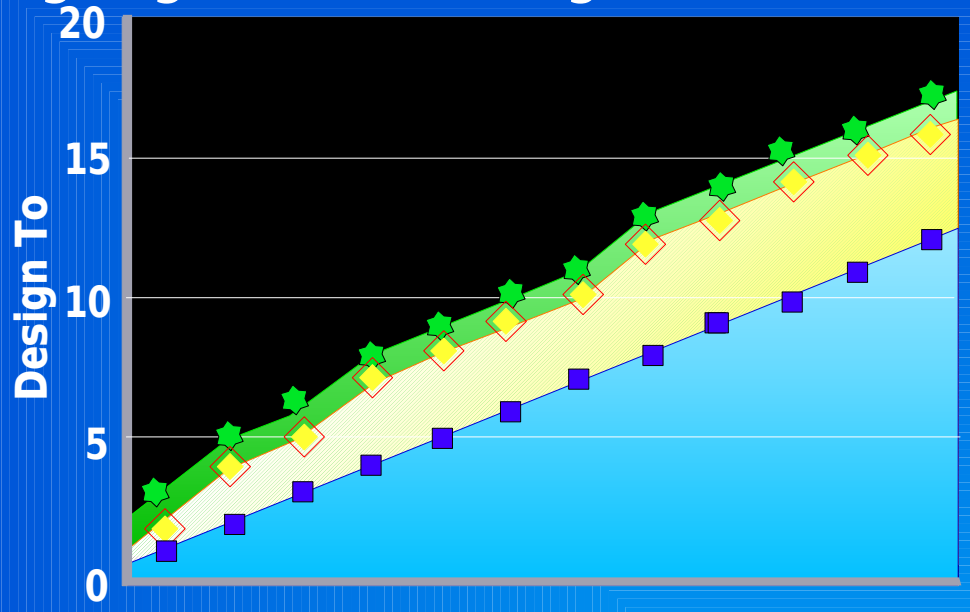
unless is serves a major generator (large discount store, shopping center, etc.)

Queue Storage

Remember:

you need almost twice the average queue for storage length

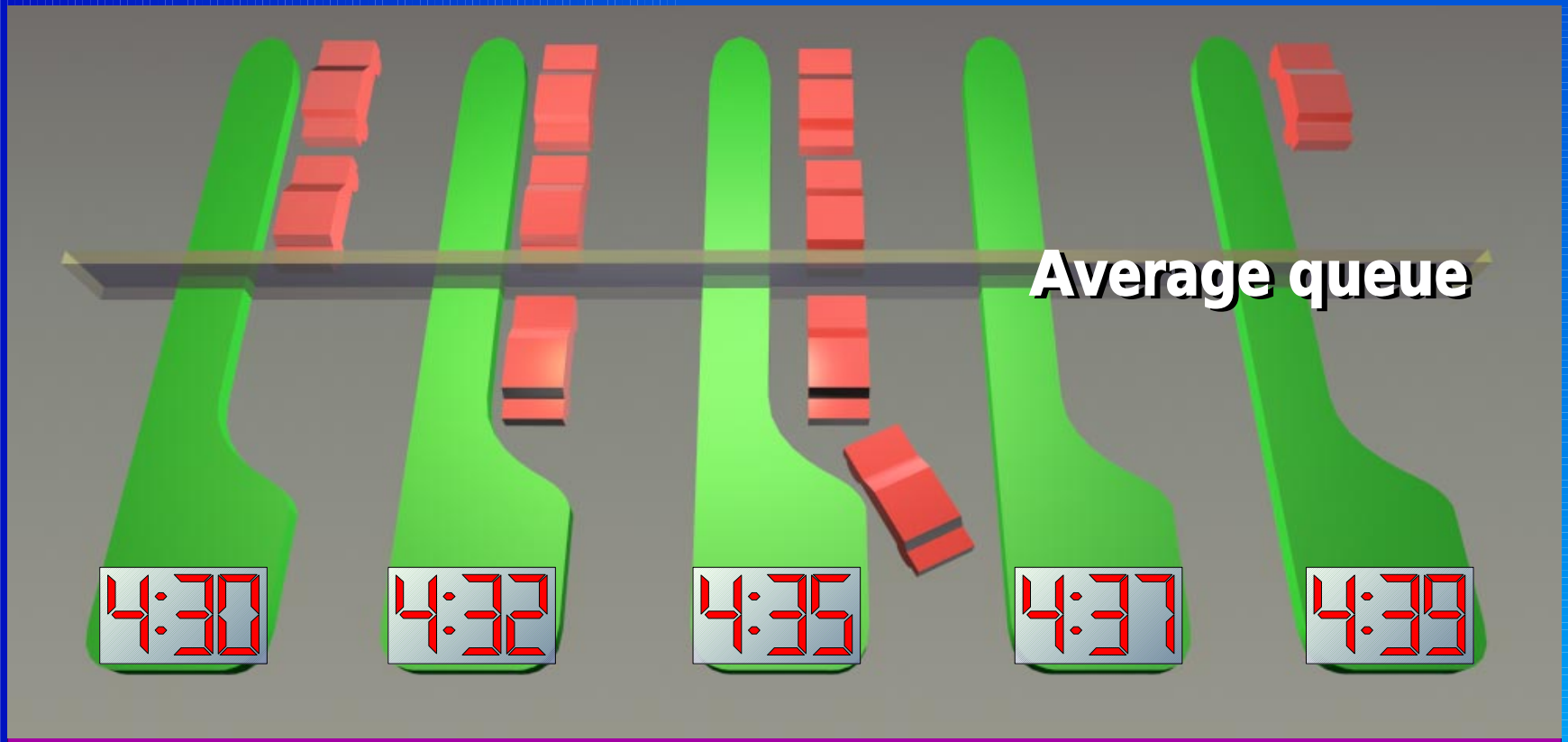
Designing Left TurnStorage for Success



Average Demand Per Cycle	1	2	3	4	5	6	7	8	9	10	11	12
30-40% Failure	1	2	3	4	5	6	7	8	9	10	11	12
10% Failure	2	4	5	7	8	9	10	12	13	14	15	16
5% Failure	3	5	6	8	9	10	11	13	14	15	16	17

Source: Use of Poisson Approximation

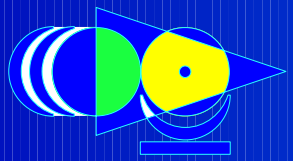
How can designing to the average fail?



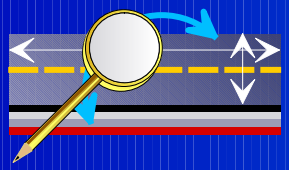
average queue = 2 cars

40% failure rate

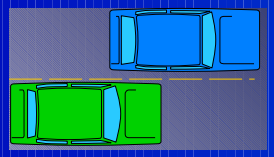
How do you project queues?



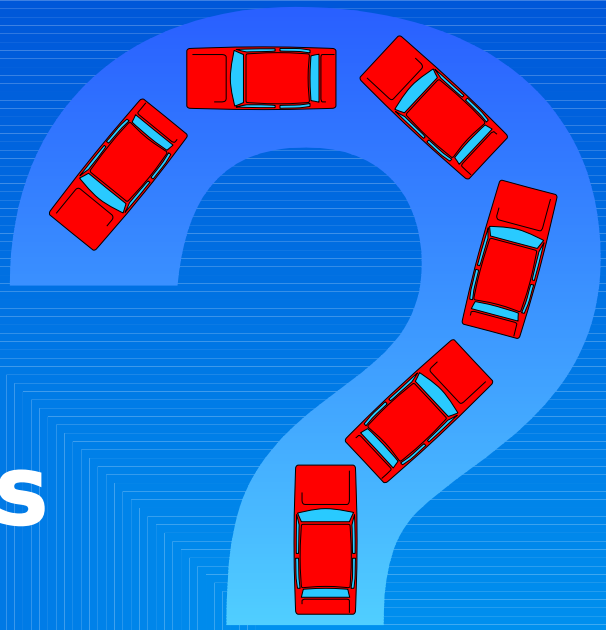
Design Traffic



Site Analysis

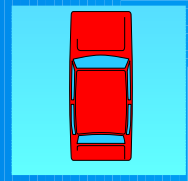


Current Conditions

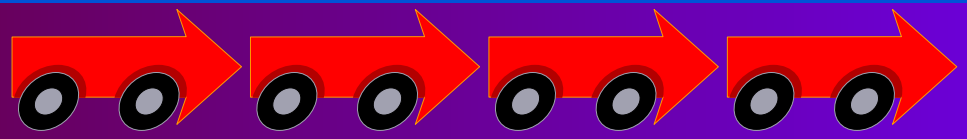
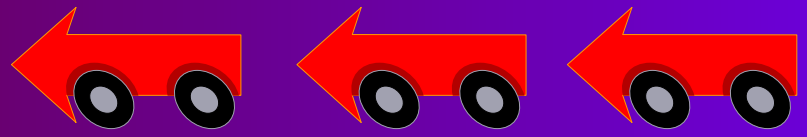
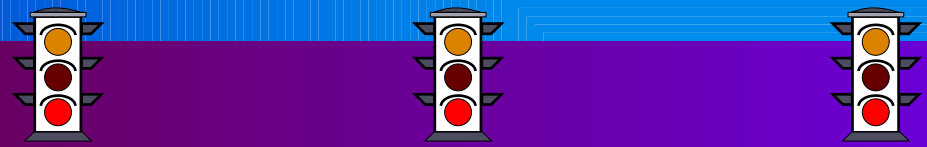
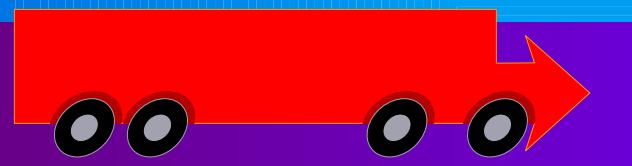


Remember -

Left turns are highly variable and hard to predict



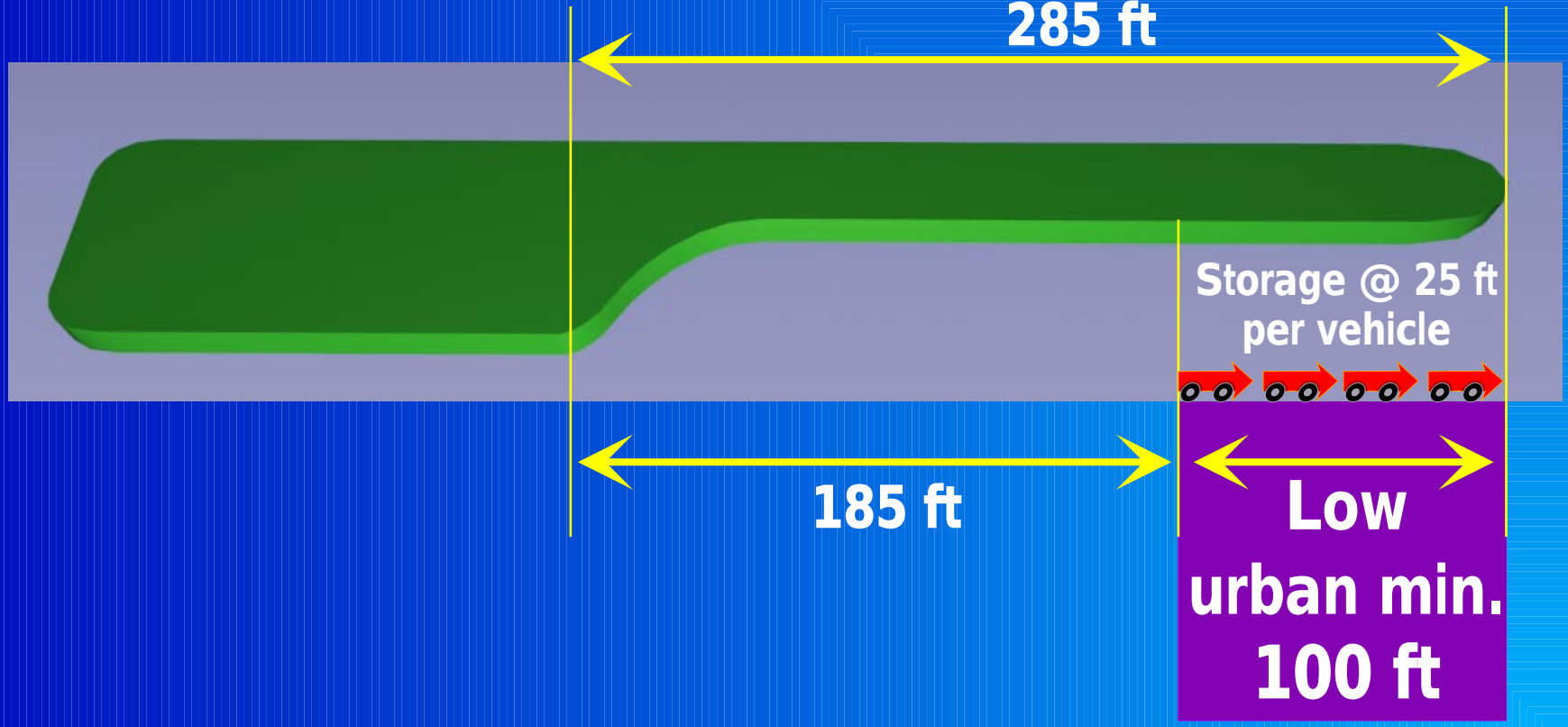
Queues depend on:

- Volumes 
- Opposing traffic 
- Gaps 
- Signal controls 
- Trucks 

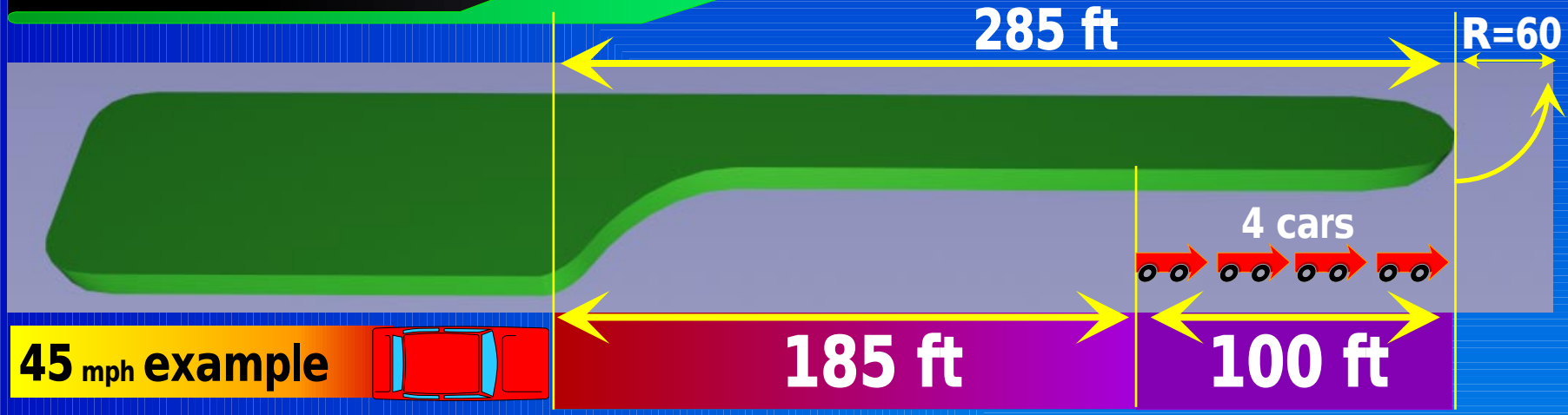
Queue Storage and Deceleration

Team Recommendation

"Low" left turn volume - urban conditions



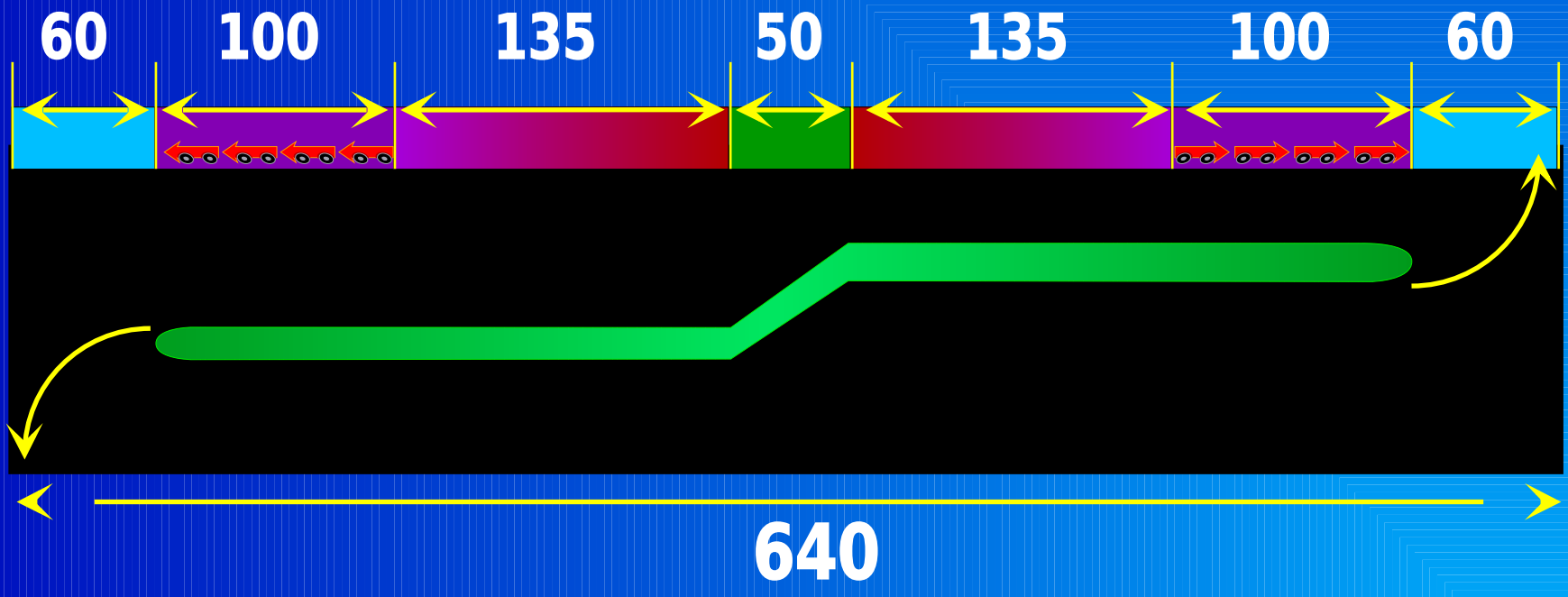
Index #301



Design Speed mph	Entry Speed mph	Total Decel distance "L" ft
35	25	145
45	35	185
50 Urban	40/44	240
50 Rural	40/44	320
55 Rural	48	385

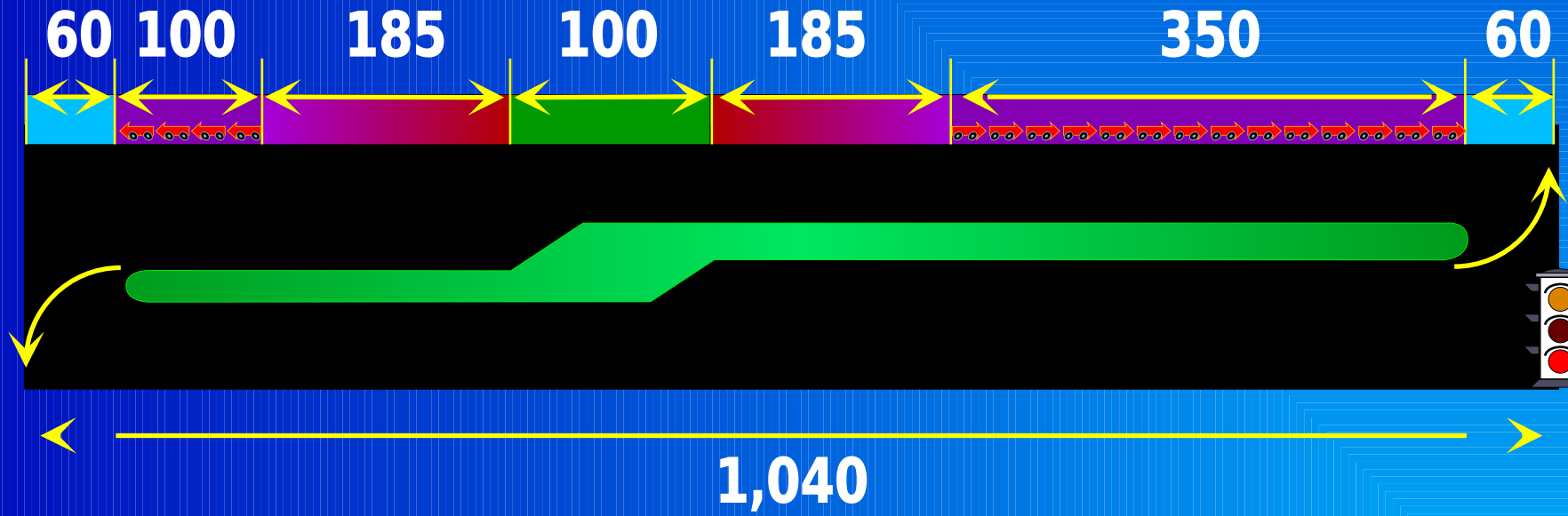
One Very Tight Possible Scenario

Urban conditions @ 45 mph design



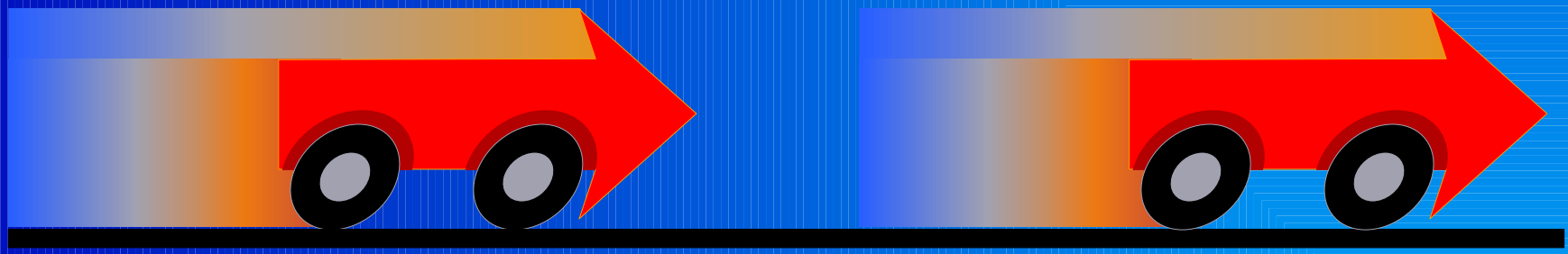
More realistic minimum scenario

Urban conditions @ 45 mph design



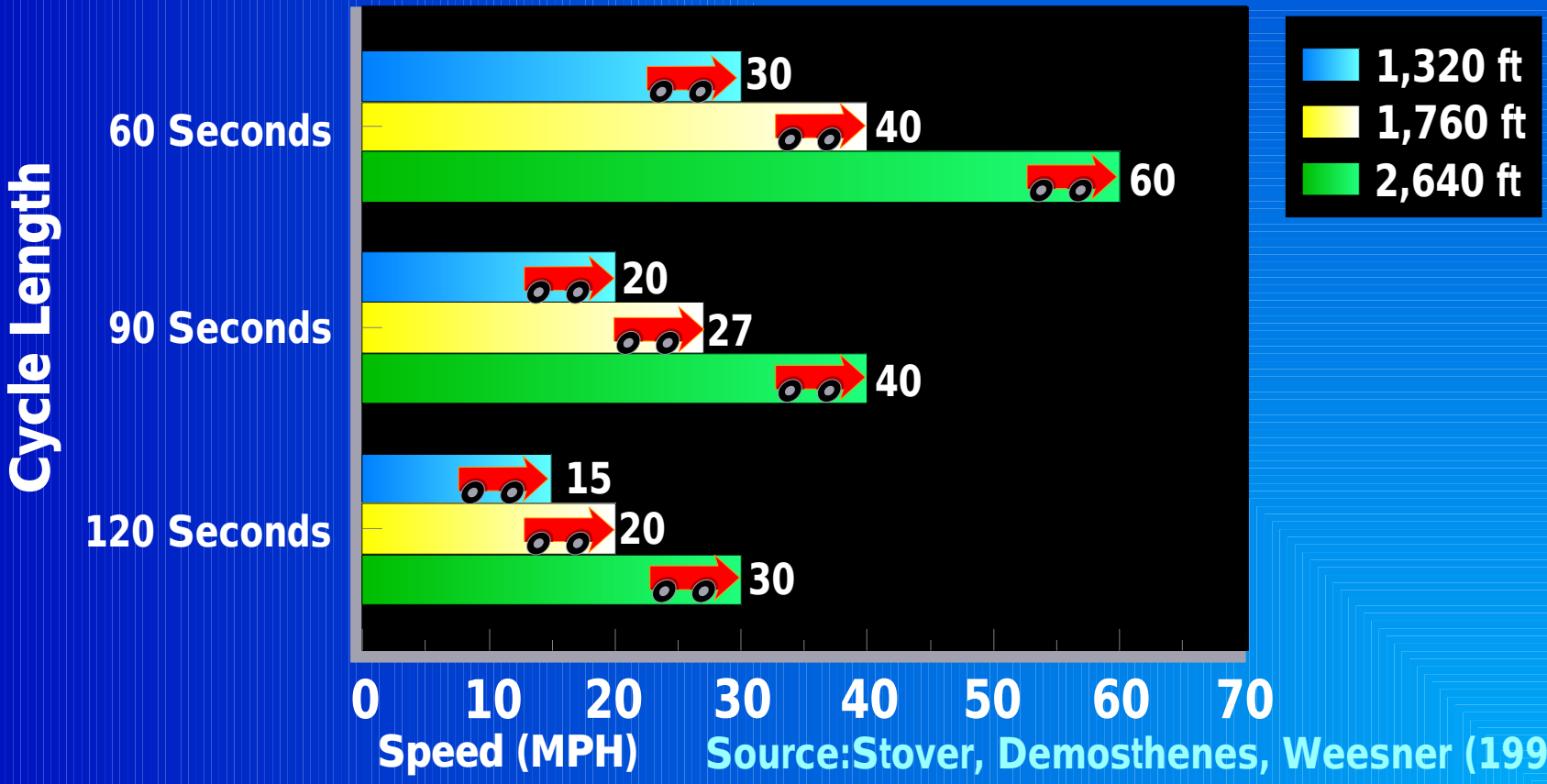
Another benefit of longer opening spacing

- Better speed and progression



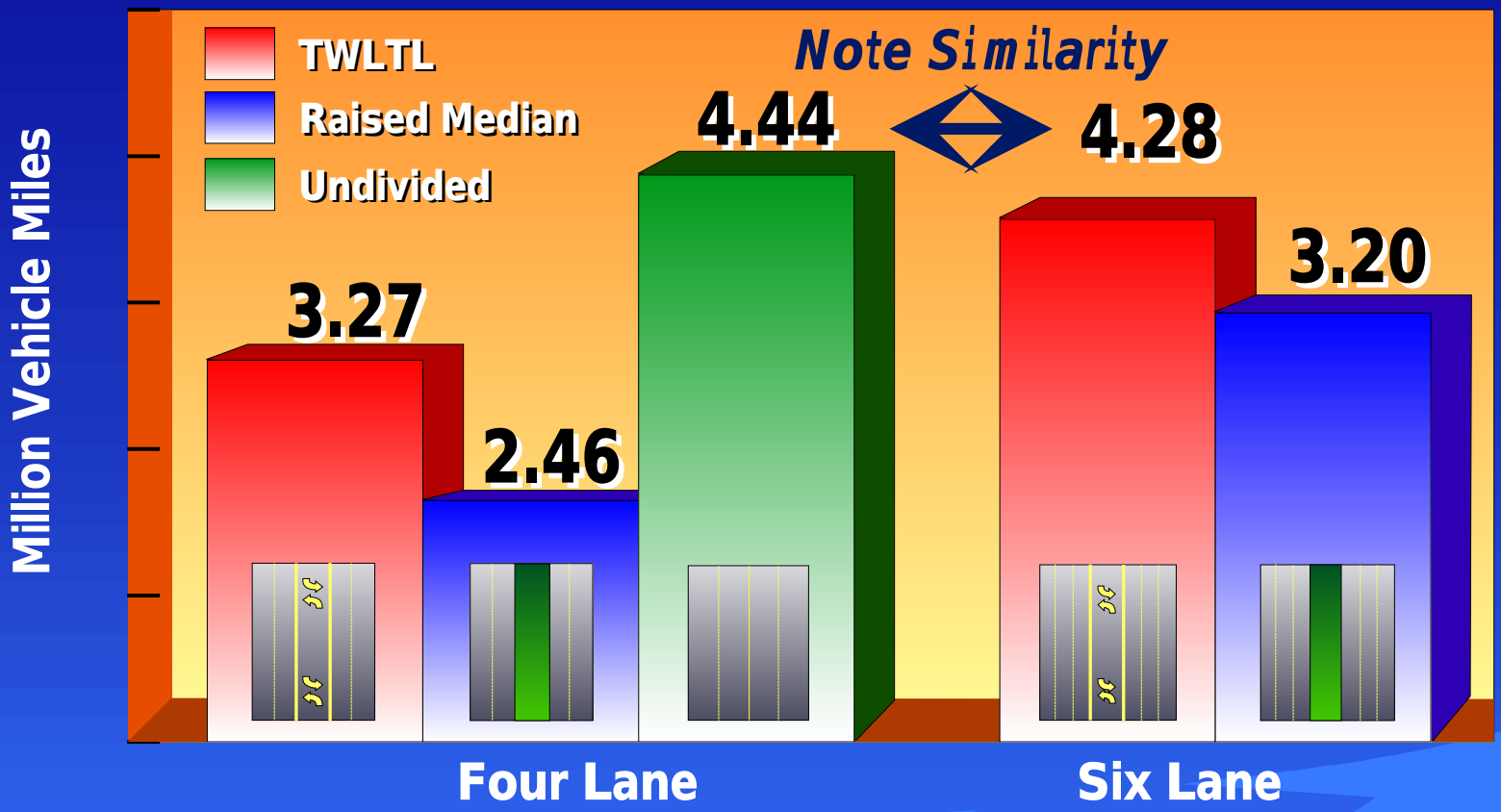
Signal Spacing and Speed

Progression Speed of Arterial



Source:Stover, Demosthenes, Weesner (1991)

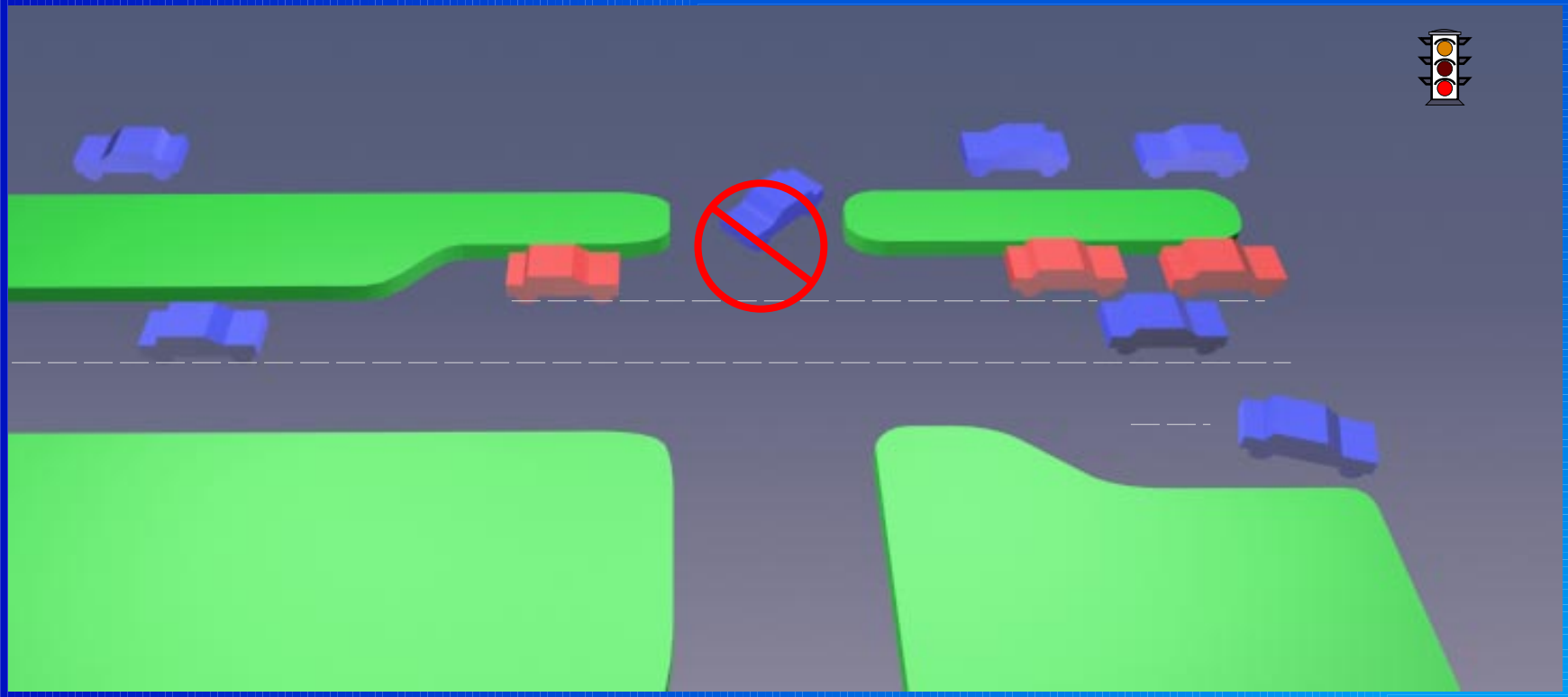
Crash Rates for Median Treatments



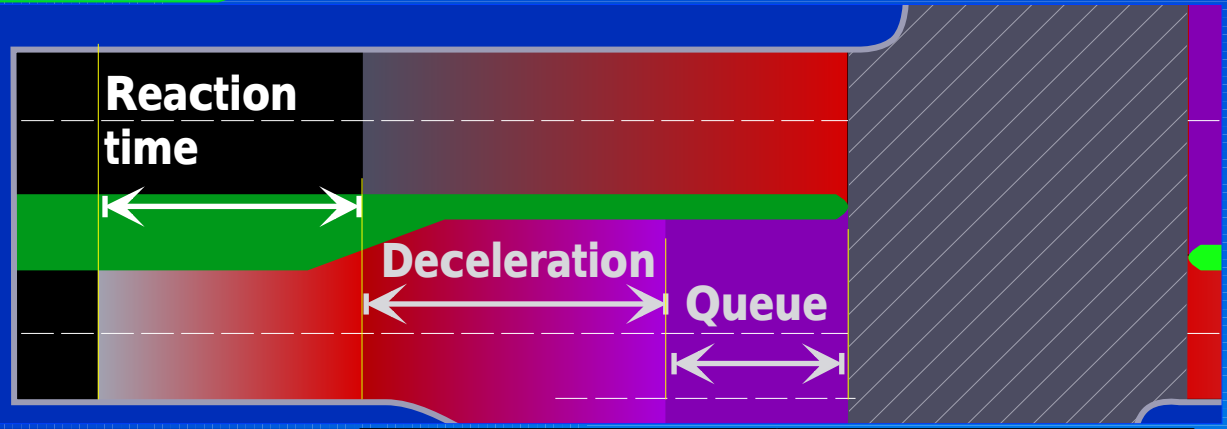
Small Town Urban Environment

- Be aware that major shopping centers and traffic generators exist here, too
- They may require more than the minimum
- At a minimum:
  Check the traffic studies done by the developer or city

No openings across left turn lanes



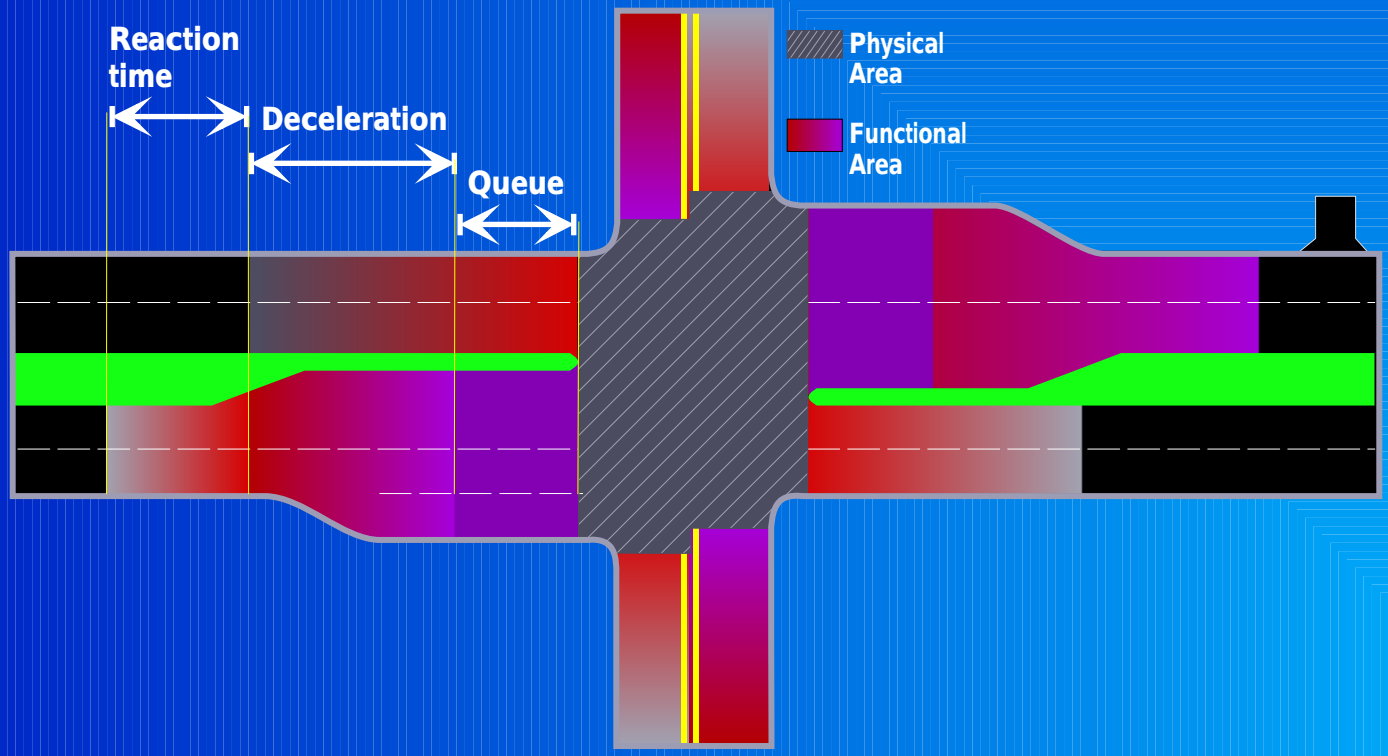
Reaction Time



Areas	Sec.	35mph	45mph
Rural	2.5	130 ft	165 ft
Suburban	2	100 ft	130 ft
Urban	1.5	75 ft	100 ft

Important Resurfacing Issues

Areas	Sec.	35mph	60km/h	45mph	70km/h	50mph	80km/h
Rural	2.5	130 ft	40m	165 ft	50 m	180 ft	55 m
Suburban	2	100 ft	35m	130 ft	40 m	150 ft	45 m
Urban	1.5	75 ft	25m	100 ft	30 m	110 ft	35 m

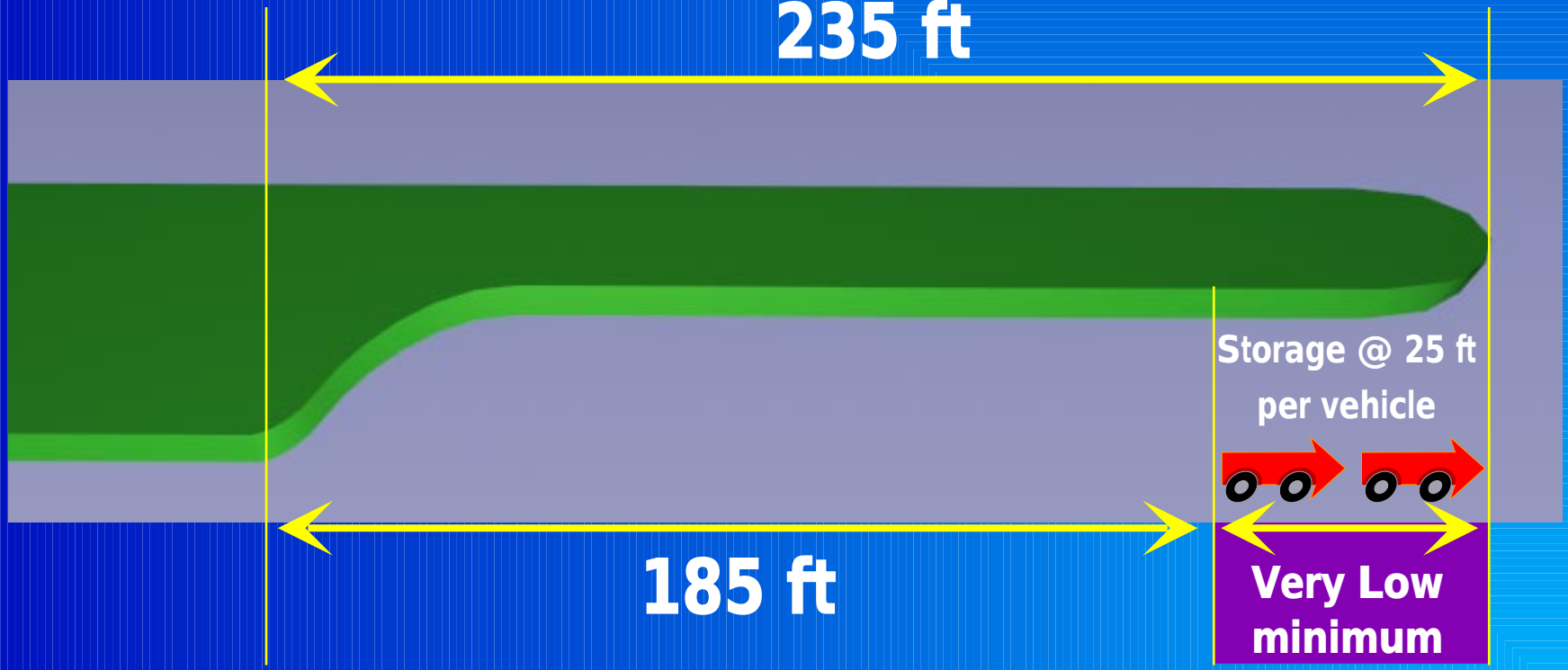


Queue Storage and Deceleration

Very low left turn volume

Small town urban environment -

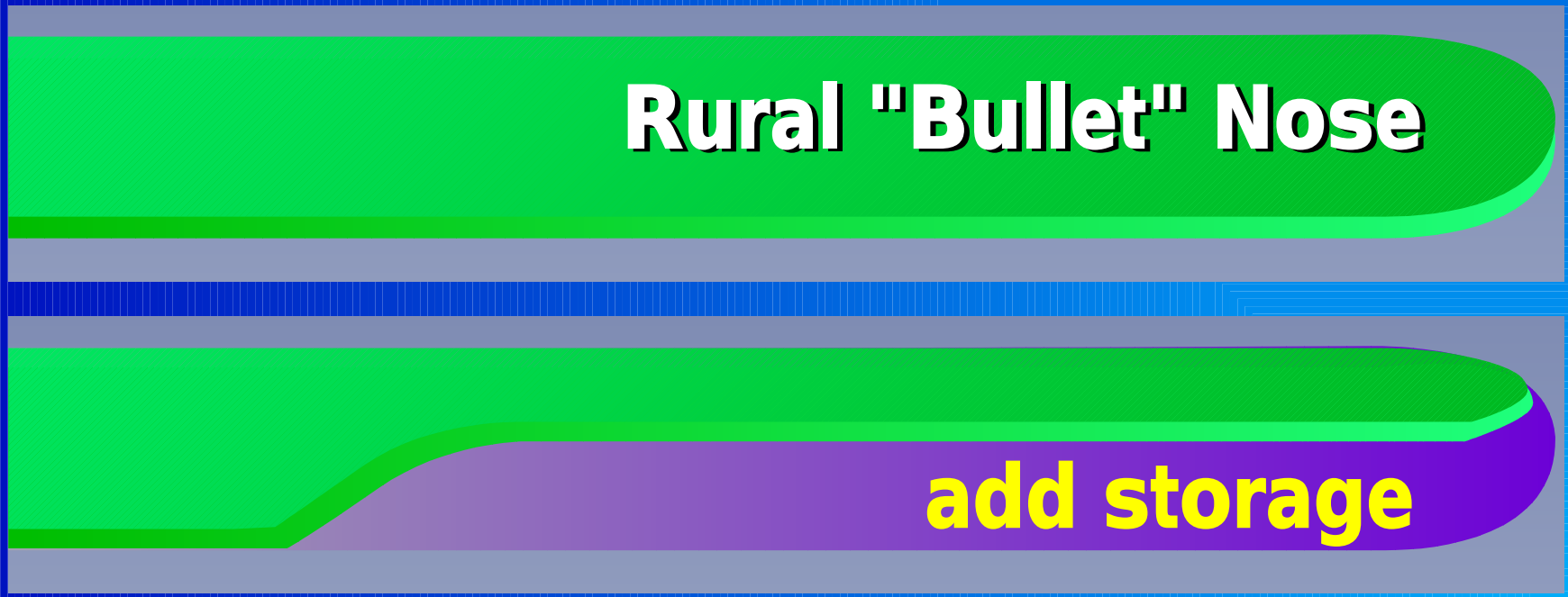
appropriate only in small towns absent a traffic study



Staying ahead of problems

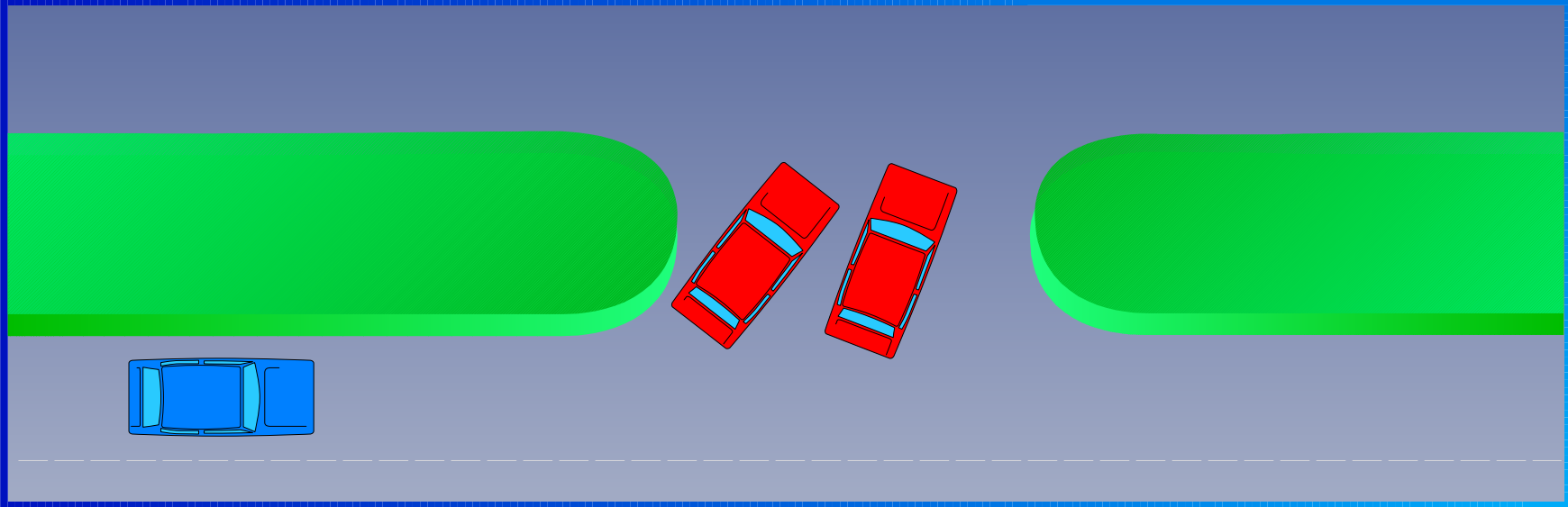
Rural multilane in suburbanizing areas

- Change bullet nose to storage
- Close under-used openings



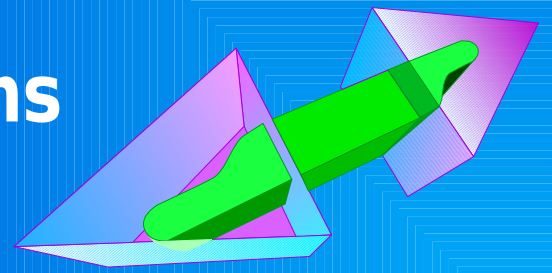
What's wrong with rural bullet noses?

- Require too much deceleration for urban/suburban traffic
- Provide too little storage



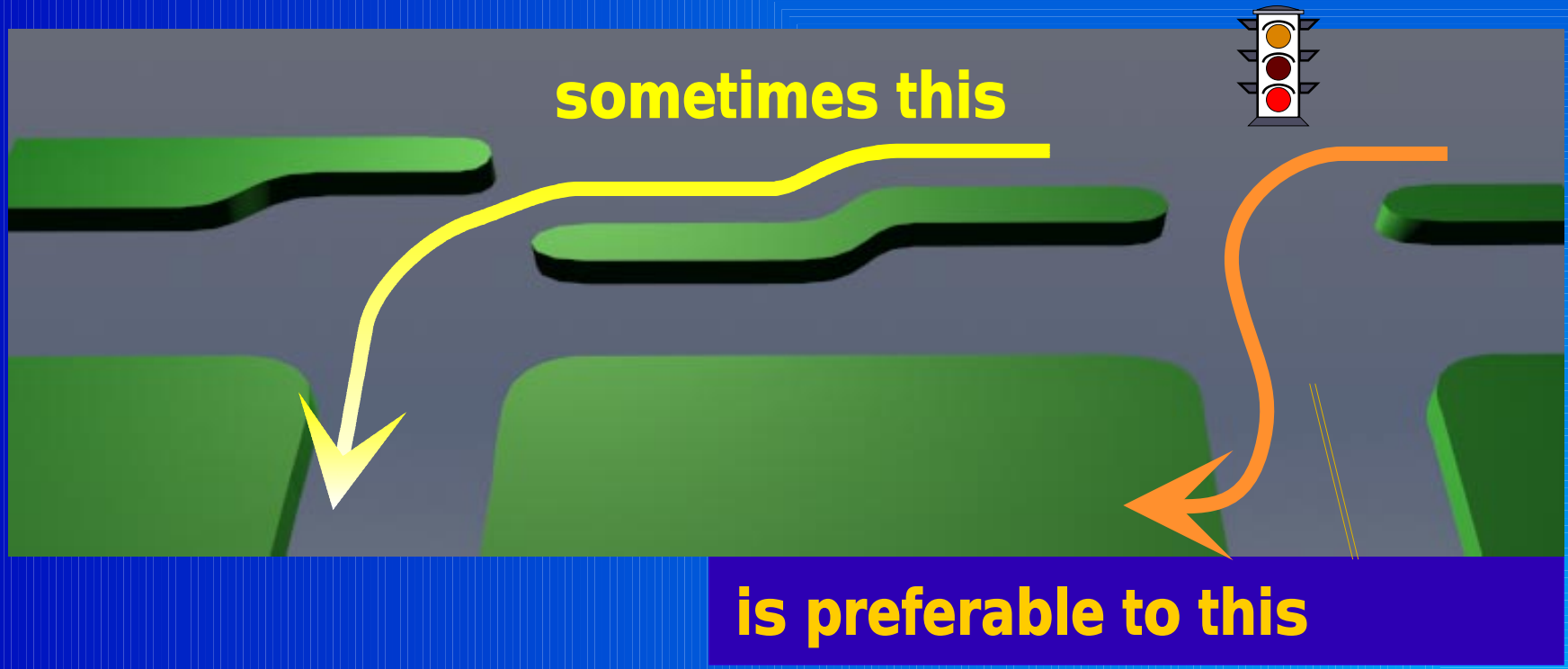
Minor Deviations

- Decision can be made by responsible engineer
- 10% for "Full" openings
  - District can be more strict
- Directional openings - "case-by-case"
- **Remember:**
  even less than 10% deviations might be a problem



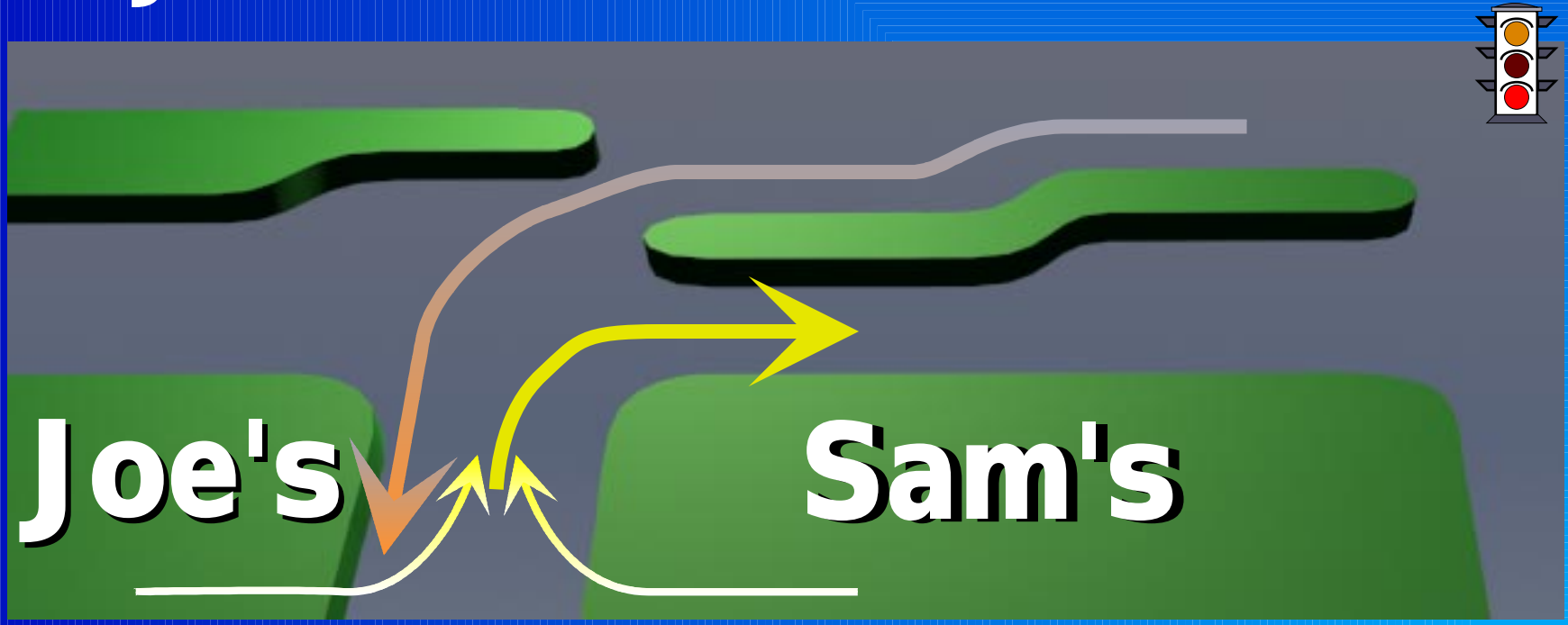
Favorable conditions

- Alleviate **significant** congestion?



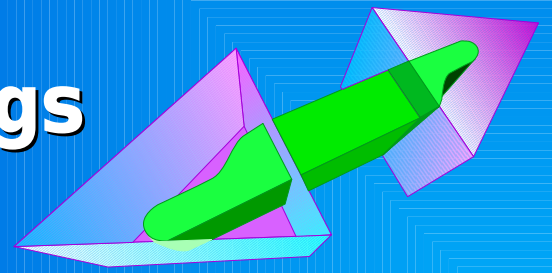
Favorable conditions

- Alleviate **significant** congestion?
- Joint access



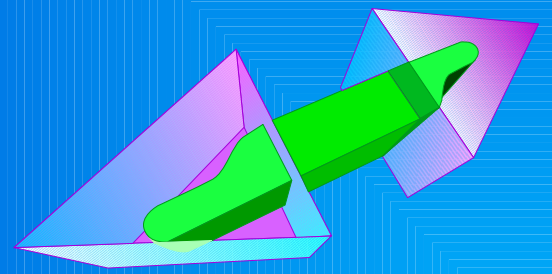
Other Conditions

- Un-relocatable or unique historic features
- Where strict adherence would cause safety problem
- Where a directional would replace a "full" opening
- Emergency vehicle openings



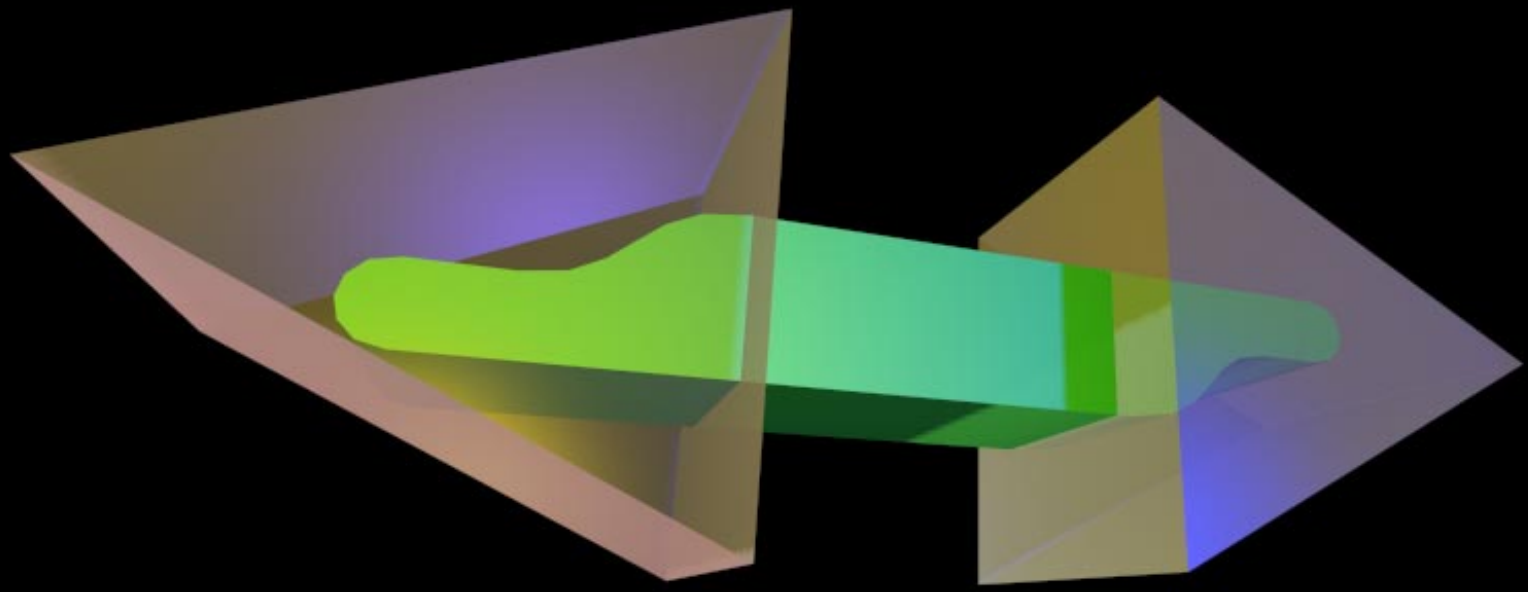
Unfavorable Conditions

- ✗ Intrastate system
- ✗ Where any openings unsafe
  example: SR 436 near I-4
- ✗ Openings in functional area of intersection
- ✗ High crash locations
- ✗ Where alternatives exist



Deviations from Median Opening Spacing Standards

A Procedure for Decision Making



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